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No.6 August 85p



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ON THE BENCH

REGULARS

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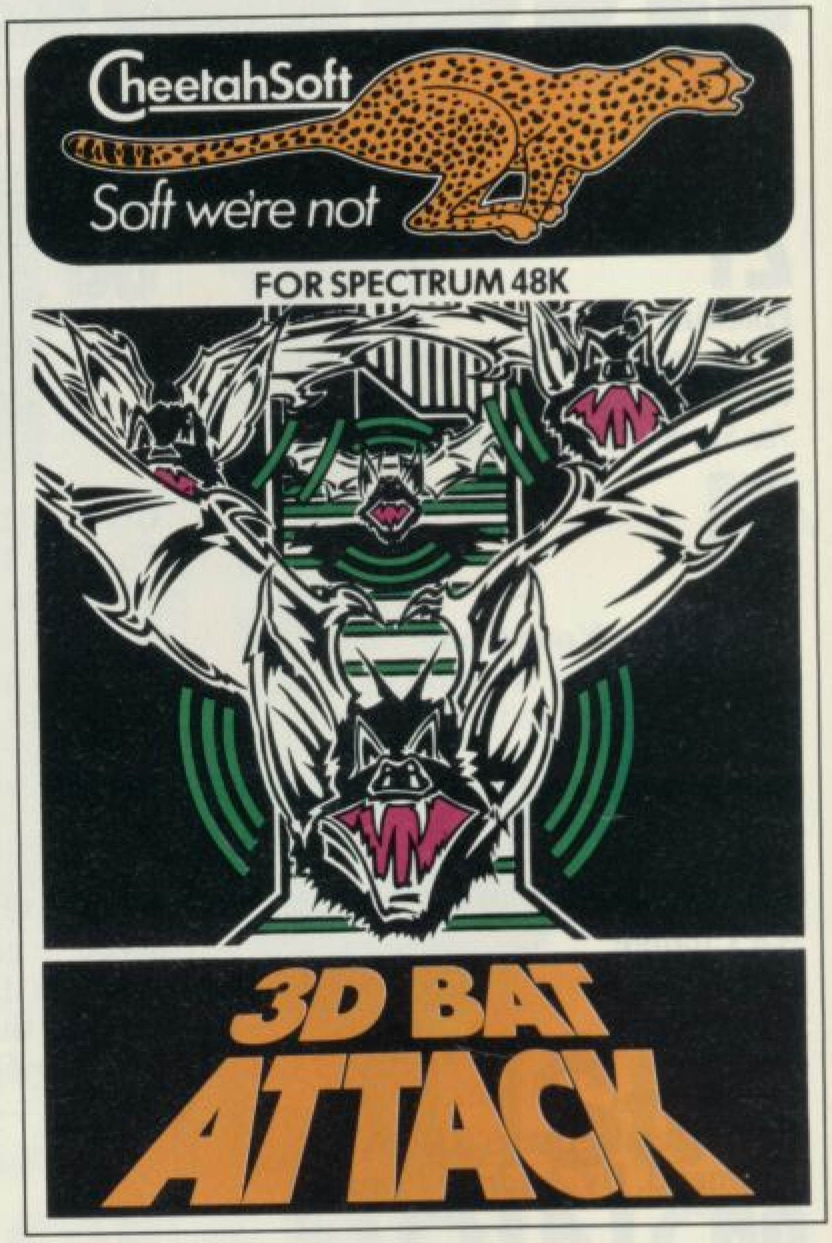
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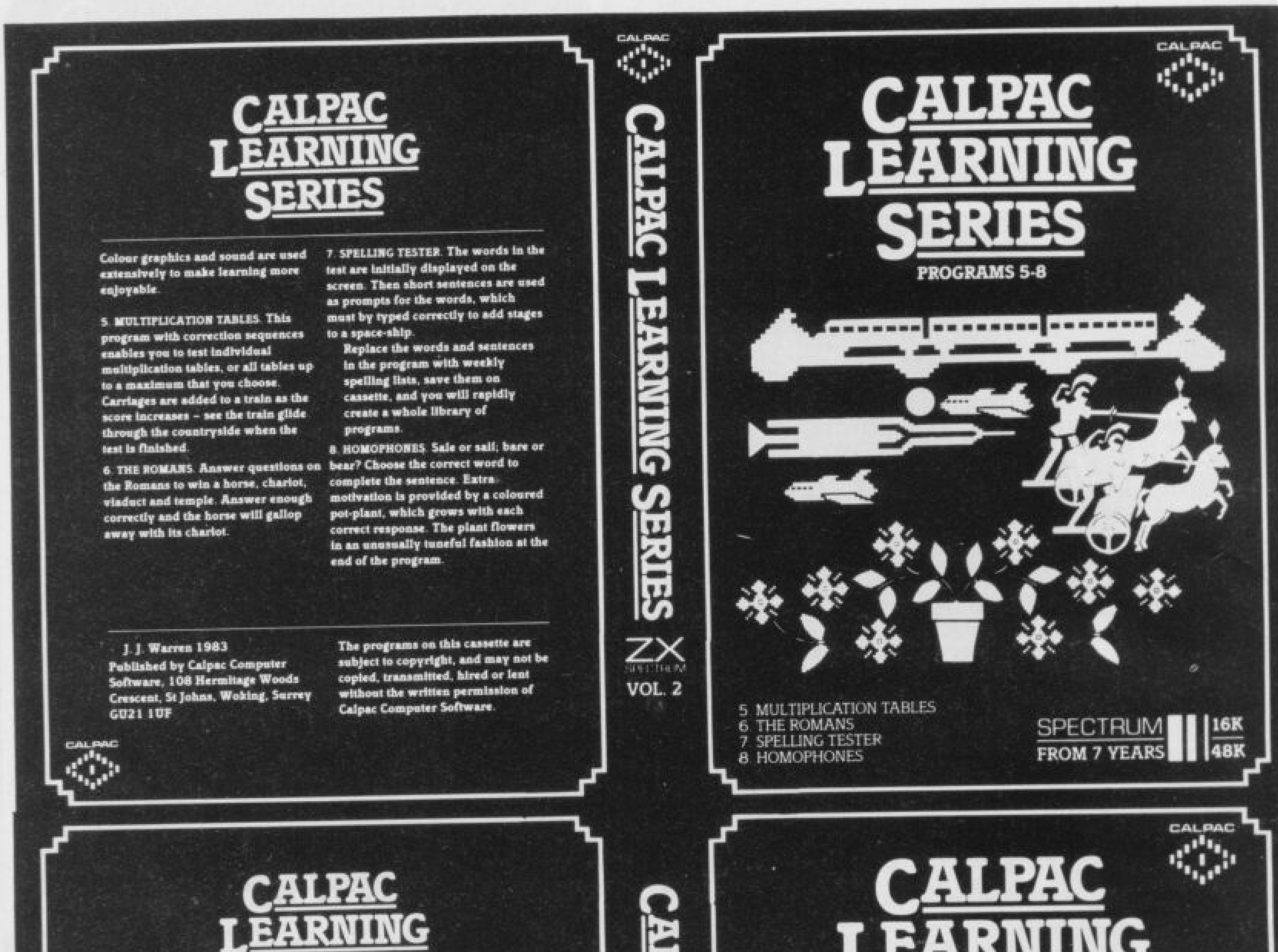
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FRONTLINES

THE TRIALS OF GOSH

The software protection debate continues unabated amongst Britain's producers, while GOSH (the Guild of Software Houses) tries to co-ordinate the efforts and ideas of its members. However, it's the feeling of a few that GOSH is too exclusive for its own good, extending the offer of membership only to friends — or companies who have close working relationships with existing members.

This feeling was expressed by Colin Stokes of Software Projects. He said, "We're doing a lot of work on software protection at the moment, but it would be easier and more effective if we could work with other GOSH members."

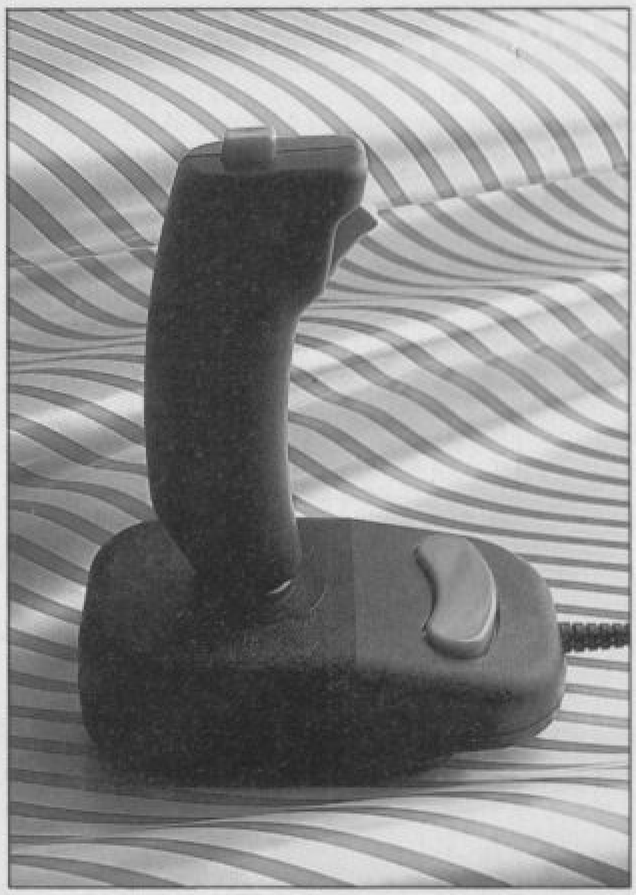
It's not only Software Projects that's feeling left out. Imagine is also out-in-the-cold, according to its spokesman, Mike Crofton. He said, "We'd be happy to join, if somebody would invite us — but so far they haven't." So what did he think about working with SP on the protection issue? Rather unkindly, he replied, "We're not interested in working with, seeing, or touching them. In fact, our pet name for them is Software Defects." All of which indicates that Imagine intends staying out on its own.

So why are these two well known and popular producers of computer games being shunned? GOSH chairman, Nick Alexander, explained that out of 36 applications, only two had been rejected (guess which!) and that the reason for this had something to do with the business practices of the two Liverpool companies. What exactly, he found so objectionable he wasn't prepared to say.

He did, though, explain why GOSH seems to be making such heavy weather of its fight against software pirates. He said confidence of the individual members has to grow — which is a slow business, especially when these people spend most of their time in direct competition. But he confirmed that £50,000 is currently being extracted from members, so that prosecutions can begin.

RABBITS!

Harrow-based Rabbit Software is planning to add another string to its bow by offering a tape duplication service sometime in August. Says director, Terry Grant, "It'll trade under the name of Soft Copy, and provide a cheap-rate, quick turn-around service." But there are no prices available as yet



IAN McKINNELL

New from Coin Controls and distributed by Kempston Microelectronics to compliment the rest of its range, comes the Competition Pro 3000. If it looks a little odd, don't let that stop you having a go — it's surprisingly easy to hold and manipulate. Priced between its sister joysticks, the 3000 will cost you just £12.75 from Kempston Microelectronics, 60 Adamson Court, Hillgrounds Road, Bedford MK42 8QZ. Those contributing to BT's million a day profits can call on 0234 852997.

QUICKSILVA SELLS OUT

Quicksilva, one of Britain's leading games software houses, has been sold to the Argus Press Group; publishers of many a micromag rival.

The deal results in the departure of Nick Lambert (QS's founder) and John Hollis. Staying on are the lovable Mark Eyles and Caroline Hayon, and 'smiling' Rod Cousins.

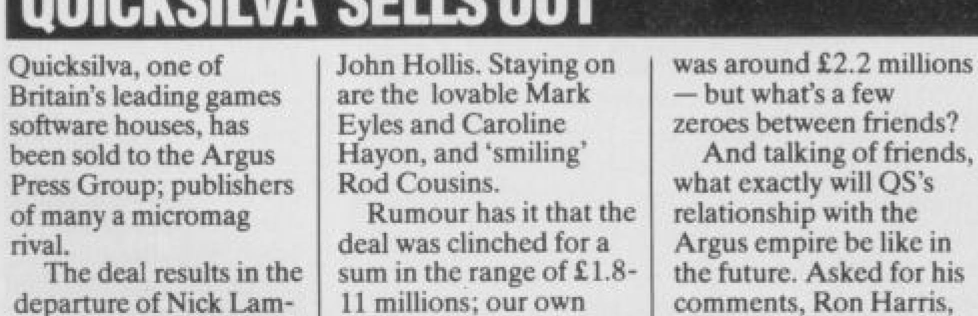
Rumour has it that the deal was clinched for a sum in the range of £1.8-11 millions; our own sources tell us the figure was around £2.2 millions — but what's a few zeroes between friends?

And talking of friends, what exactly will QS's relationship with the Argus empire be like in the future. Asked for his comments, Ron Harris, managing director of Argus Press Software, explained that Quicksilva would become part of his organisation, and would continue to operate much as normal. He attempted to allay fears of incestuous business practice by claiming, "We are committed to an expansion programme, and it's too late for us to develop our own arcade range quickly — this seemed the logical thing to do."

Would there really be no conflict of interest? "No", he said, "there'll be none! No one from Quicksilva will be working at this office — and Argus Press Software is totally separate to Argus Specialist Publications." Hmm, there's at least a floor between them — and some may also wonder why Ron Harris appears on the masterhead of *ZX Computing* (another Argus publication) as the managing editor.

Quicksilva's Rod Cousins made a statement a few days after the event. He claimed that QS would continue as an independent company, with a board consisting of Jim Connell (Chairman), Rod Cousins, Ron Harris and Mike Dougan (the Argus money-man). He went on to explain that with forward planning a priority, the benefits of a substantial group would ensure the stability, security and growth pattern desired by Quicksilva at a time when the risk factor in games software production is increasing.

But the last word goes to manic Mark Eyles, "It's very exciting for us — and if you think that Quicksilva's done some amazing things already, just wait 'till you see what we've got lined up for the rest of this year and next."



TONY SLEEP

Selling out? Not a bit of it, claim Mark Eyles, Caroline Hayon and Rod Cousins — the newest link in the Argus chain.

ATTIC ATTACKED!

It's not often that a software house comes up with the goods on how to break in the manipulate its own commercial output — but that's exactly what Software Projects are doing with its *Jet Set Willy* package. The much-publicised "sneaky random hazards feature" which befell unsuspecting players entering The Attic seems to have turned out to be the bug we all thought it was, and thanks to Ross Holman and Cameron Else (winners of the *JSW* champagne and glasses) the company now have a number of 'fixes' you can add to your program. And this is what you do . . .

Rewind the *Jet Set Willy* tape and load it using MERGE "", press Enter and start the tape. Once the loader program has been loaded you will get the 'OK' message on the screen and you should stop the tape. Now enter:

```
CLEAR 32767
LOAD "" CODE
```

as direct commands and start the tape. After the main part of the program has loaded, enter the following as direct commands:

```
POKE 60231,0
POKE 42183,11
POKE 59901,82
POKE 56876,4
```

and your problems should be over. To start the new version of the game, enter GO TO 40.

Of course, if you don't want to go through this process each time, you can save it on another tape. So, once you've sorted out the leads for a SAVE, enter:

```
SAVE "JETSET" LINE 10
SAVE "JSW" CODE
32769,32768
```

FROM THE HIP



As usual the phones here have been jammed with problems ranging from the highly intellectual to the bl**din' obvious. However, a goodly proportion concerned our article on *Jet Set Willy* — the hacker's guide. Andrew Pennell (bless him) aroused such interest that every five minutes I was expecting another call from a frustrated addict, desperately seeking the POKEs for infinite lives. Unfortunately, we didn't think we'd be able to give them out — we didn't want to cross swords with Software Prjects too much — but as they've given us kind permission to print them, you'll find them buried deep inside this issue. Meanwhile, if you have any further queries on how to 'cheat' at games (or you've already worked out the details!) drop a line to Andy at *Hacking Away, Your Spectrum, 14 Rathbone Place, London W1P 1DE.*

Phew, that done, on with the usual stuff . . .

TURBO SUPREME

Steven Potter from Liverpool phoned in about the pros and cons of the RAM Turbo and Sinclair Research's own cartridge/joystick interface. Well, Sinclair Research's version is supposedly the 'standard' by default, but unfortunately each software house has its own ideas. One of the most popular joystick interfaces is the Kempston version, while the cursor controlled 'sticks have a large following. The Sinclair Research model works on a pretty odd format, keys '6' to '0' for Player One joystick controls and keys '1' to '5' for Player Two controls. The Turbo, however, works on nearly every format currently available; the Kempston, cursor and Interface 2 type of joystick are supported by multi-protocol software, so compatibility is not really a problem. Kempston has also launched a cartridge interface, but let's not confuse the issue. My conclusion is that the extra £3 you pay for the Turbo *is* worth it.

QL GOES TO EPSON

Another call came from Merseyside — this time from Simon Rainfrey concerning the QL. Simon, like many others has ordered the machine, and wants to know whether it's compatible with his Epson FX-80.

With a serial interface, yes, as a bog standard machine, no. You need either an RS232 interface for the Epson (provided by Epson), or a Centronics interface for the QL, available from Miracle Systems Ltd. We've got both, but prefer to use the Centronics version. It's up to which you prefer.

THE 'IN' SOLUTION

Tim Ward, a defender of the Z80 from Corpus Christi, Texas (what a readership!), wrote to me about the problem I was having with the IN command (see last issue). It transpires that on issue 3 machines, the ports were changed so that bit 6 fluctuated — this meant that programs written for issues 1 and 2 Speccys wouldn't work if they made use of the IN command. The routine written by Tim (shown below) masks bit 6 and gets a 'proper' reading of the ports rather than depending on the IN command.

Here's what he came up with. To get the routine to work, type in the Hex (the left-hand column), letting 'a' equal the address of the code.

HEX	ASSEMBLER
21 00 FE	LD HL, port
7E	LD A,(HL)
CB 77	BIT 6,A
20 02	JR NZ, off
	on
CB F7	SET 6,A
4F	LD C,A
C9	RET

```
POKE a+1, port-256*INT
(port/256)
POKE a+2, 254

LET code=USR a
```

Once the code has been typed in, POKE the values shown (where 'port' is the port number you want to read) and then use the simple USR call to return the value of the port in the variable 'code'.

Catch you on the phone . . . **Troubleshootin' Pete.**

CAUGHT IN THE ACT

Sinclair Research has given written assurances under Part Three of the Fair Trading Act 1973 that it will not advertise delivery times of goods that the company can't keep.

These assurances were sought from the company after the Director General of Fair Trading, Sir Gordon Borrie, had received complaints between February 1980 and November 1982 that the company was advertising 'delivery in 28 days' or 'Please allow up to 28 days for delivery', but was clearly unable to dispatch the goods within that period. The complaints related mainly to the ZX80, ZX81 and ZX Spectrum. During the Summer of 1982 the company's own estimate of delivery times reached 12 weeks and some customers waited up to 16 weeks for receipt of goods. Sir Clive Sinclair gave a personal assurance about this matter. In a statement made by Sinclair Research it was claimed that once it was realised demand was exceeding supply, advertising was stopped. Customers who didn't want to wait for delivery were given the opportunity to cancel their order and ask for a refund.



TONY SLEEP

Sir Clive Sinclair — on time from now on?

It's rather surprising, therefore, that Sinclair Research didn't decide to stop advertising the QL as soon as it realised demand was exceeding supply once again.



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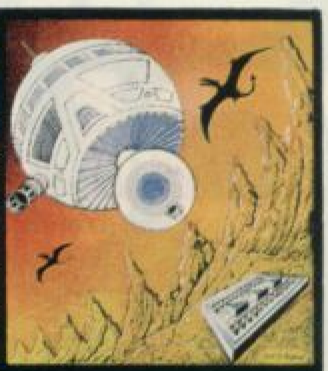
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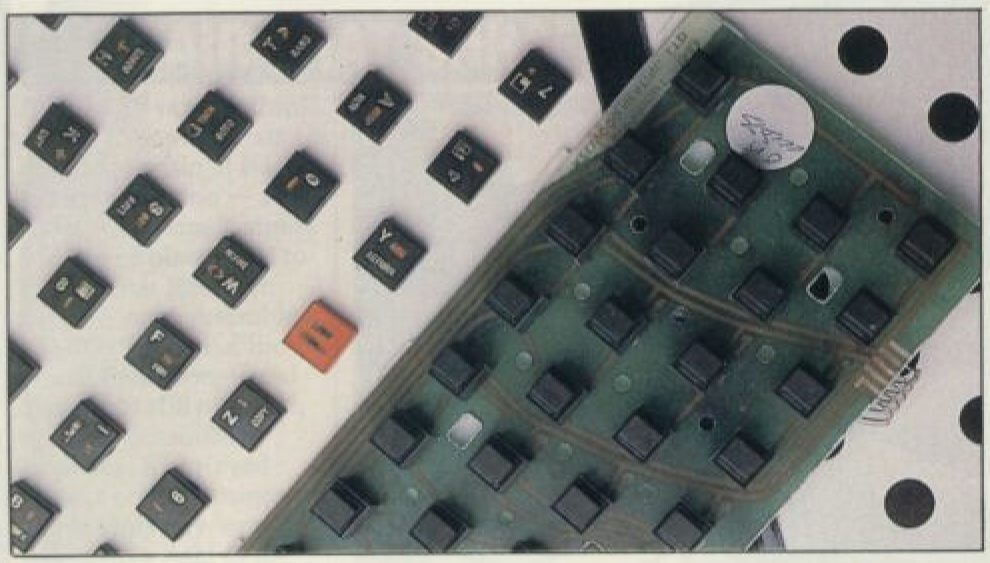
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A new keyboard for the Spectrum is available from Kelwood Computing, but unlike alternative products which have used a completely new housing, this one actually fits in place of the rubber mat. It's an arrangement that's been made possible as a result of the discovery of a more compact switch. So, for £28.50, you get the board which supports these mini-switches, and this simply replaces the old assembly, connecting to the main circuit board via two small pieces of PCB which terminate the ribbon cables. This done, installation is now completed by replacing the Spectrum's metal template over the black keys which are hot-foil-printed in red and gold. Their operation is claimed to give positive tactile feedback while having a travel distance of less than 1mm. Place your orders with Kelwood Computing, Downs Row, Rotherham, South Yorkshire (0709 63242).

IAN McKINNELL

HAPPY TALK

Personal computing need no longer be a solitary pastime now that Protek Computing has announced a new low-cost acoustic modem that enables Spectrum owners to 'talk' to one another — or indeed to a large database such as Prestel. All you need is a telephone, and a healthy bank account to cover BT's ensuing financial demands.

Known as the Protek 1200, it makes use of two operating rates. One is for high-speed (1200/1200) computer to computer communication such as the transfer of keyboard to keyboard information, blocks of data or complete programs. The other, slower speed (1200/75), is used for communicating with databases and bulletin boards, and while some of these will require special software to decode the teletext output, that can be supplied at additional cost. Other features include a flexible design that allows the modem to be used with most telephones (excluding Trimphones), the use of four 1.5V AA batteries to ensure portability, and a light emitting diode (LED) to show that it's switched on.

The cost of the modem is £59.95, plus another £24.95 for the necessary interface, cable and software. Further information and orders to Protek Computing, 1a Young Square, Brucefield Industrial Estate, Livingston, West Lothian. Telephone 0506 415353.

ROMANTIC TRANSFERS

At first sight you might think an outfit calling itself Romantic Robot would be heavily into mechanical clones of Barry Manilow or even worse (*What could be worse? Ed.*). But you'd be wrong, for RR is a software house, eager to help users 'exploit' the Microdrive and all its charms.

In a software series called *Trans-Express*, Romantic Robot is offering cassette versions of such snappily-named programs as *Tape To Microdrive, Microdrive To Microdrive, Tape To Tape* and *Microdrive To Tape*.

From a brief glimpse snatched while visiting this year's Computer Fair, the facilities offered are user-friendly and contain various error-trapping routines and tests to stop you losing your precious code. No doubt, what many buyers will have in mind is to copy vast quantities of commercial-based software to Microdrive.

So far, there's been little reaction from software houses — perhaps because they've yet to grasp the implications. But, if you're the proud owner of Microdrives and fed up with the amount of software currently available on this medium (ie. none) then this package will allow you to transfer across some of the material you now have on tape. What's the point of having a Microdrive if you're not able to use it? Of course, the software houses may take a different point of view.

Anyone interested in this clutch of programs can contact Romantic Robot direct at 113 Melrose Avenue, London NW2 4LX. The prices are £5.50 each, £7.50 for any two, or £9.95 for the lot.



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THE FAIR THAT SHRANK

June 14-17 saw the third annual Computer Fair, held once again at Earls Court in London — and it was small, small, small!

Pride of place went to the Sinclair Research stand — whch resembled a 1980's version of the Greek Pantheon — and there, that still rare bird, the QL, was much in evidence. Keen-eyed visitors on the Business/ Trade Only day were treated to a sight of the diminutive Sir Clive moseying round his stand, perhaps in search of some good publicity to support him in his current enthusiasm for taking over as purveyor of the Beeb's official machine.



Sshh! You'll break their concentration. Just some of the excited throng surrounding the Sinclair Research stand.

TONY SLEEP



No, they're not from Rabbit Software — it's just Troubleshootin' Pete and his mate Tony Samuels.

TONY SLEEP

An interesting addition to this year's binge was the computing junkshop. Two were in evidence, selling a motley array of unwanted secondhand bits and pieces of computing gear. 'Bargains' could be had for just a small sum, albeit the goods lacked any kind of guarantee.

Perhaps the main story of the show was that given a huge venue like Earls Court, it was disconcerting to find our once favourite thrash tucked away in a small part of the building, somewhere upstairs at the back. There were not only fewer stands overall, but some were conspicuous by their emptiness. The much publicised 'Sinclair Village', for instance, had magically tranformed itself to a single street!

According to the Exhibitions Manager of the Computer Fair, Roy Bratt, although the Fair seemed smaller than last year's, it actually covered the same floor space — probably due to there being bigger stands and fewer of them. Attendance this year was down 20,000 on last year — which could be a trend, especially when you consider that the recent Commodore Fair's attendance was down 10,000 on its previous bash. Encouragement can be gained, however, from the fact that Roy's already got the next Computer Fair well in hand — just wait 'till next year, eh Roy!

SPEED MACHINE

A new concept in loading cassette programs is available from Challenge Research. The Challenge Sprint cassette player is capable of loading standard Spectrum cassette software at four times the normal speed of a standard player.

The main features of the Sprint are that it retains the standard Spectrum commands and format, uses advanced digital circuitry and signal processing (which eliminates volume setting worries and improves loading reliability) and simply plugs into the Spectrum port. It even has its own expansion slot so that you can use other peripherals at the same time. A full 48K program will load in 75 seconds — compared to five minutes on a conventional recorder.

At £64.95 including handling, the Sprint is not cheap, unless you happen to believe that time is money. You can order one by telephone via Access or Visa plastic cash on 0707 44063; alternatively, write to 218 High Street, Potters Bar, Herts EN6 5BJ.

IT'S ON THE CARDS

Anyone remember that funny looking, half-completed joystick interface with all those wires and clips — the branchild of those lovely people at AGF and the only hardware programmable interface on the market? Well, they've done it again, only this time it's a far more professional product that's been housed in a tough injection moulded plastic case.

The AGF Protocol 4 utilizes snap-in program cards that can be hardware programmed to work with all Spectrum software as well as any of the other joysticks currently available. Supplied with the interface are four pre-programmed cards that enable immediate use with AGF, Protek, Kempston and ZX Interface 2 protocol, in addition to one blank. Also included is a recessed reset button that eliminates the need to pull-the-plug every time a machine code program is cleared. So with the possibility of connecting up to five units, and the promise that it will accept a trackball, this looks like being a real winner.

Check with AGF Hardware, FREEPOST, Bognor Regis, West Sussex (0243 823337). Further sets of blank program cards can be ordered at an additional cost.

SPECTRUM CONTROL

Project 5: Machine Code Countdown

One of the most frustrating things about running a newly written machine code program is the way it crashes (well, usually) without giving any indication of what's gone wrong. But suppose the current value of the program counter were to be printed at the bottom of the screen and constantly updated as successive instructions are executed? This would certainly prove to be a useful feature, giving the final address of the instruction that caused the program to go haywire. From there, it would be a simple matter of examining the offending code and making the necessary changes.

So that's the problem to be solved in this month's project. The program counter value should be displayed at the bottom left-hand corner of the screen, and must be updated as each instruction is executed. And to make it possible to follow the flow of a program, a timing loop must be included in your display routine answers — so that each value stays on the screen long enough to be read and written down!

Address all offerings — meagre or otherwise — to *Mad Ronno, Spectrum Control, Your Spectrum, 14 Rathbone Place, London W1P 1DE.*

DYSLEXIA RULES KO!

The Computer Fair was opened this year by actress, Susan Hampshire. An unusual choice, you might think, but she had another reason to be there ... Ms Hampshire suffers from Dyslexia — an affliction otherwise known as Word Blindness. The problem affects one in ten children in this country, some of the symptoms manifesting themselves as a difficulty in recognizing letters, inadvertantly reversing letters, and difficulty with sense of direction.

Dyslexia has only recently been recognized as a medical problem that can be resolved with the correct teaching, and now Martin Dunitz Publishers has found a way of helping sufferers from five to 15 years of age — using the ZX Spectrum.

It seems many Dyslexic kids are perfectly dextrous at two- to three-dimensional skills — for instance, the working of a computer keyboard. So, in conjunction with one of Britain's leading experts in the field, Dr Beve Hornsby, the company has developed a set of three arcade-style computer games, all on one cassette. The game itself costs £9.95 or, for a special offer price of £12.95, you can have the cassette and a book written by Dr Hornsby called *Overcoming Dyslexia.* The game features a hero character called Dyslexia Beater and you can play it on any of three levels, making it adaptable to virtually any age group.

The book and cassette are available from Martin Dunitz Ltd, 154 Camden High Street, London NW1 0NE (01-482 2202).



For sufferers of Dyslexia, a cure is on its way courtesy of the ZX Spectrum.

TRANSFORM YOUR SPECCY

Thinking about upgrading the keyboard on your Speccy? If you fancy taking a step towards something more professional, then it's worth taking a look at the one offered by Transform Ltd.

Priced at £69.95, the case is made of black annodised aluminium and is capable of incorporating both Microdrive and Interface 1. It's taken over a year to get the product to its finished state, so it's got all the features you'd expect: an LED to indicate when the machine is switched on; full-size Space bar; large Enter key; separate keys for full stop, semi-colon, delete and edit.

No soldering is required for connection and, although there have been production problems in the past, the company is now happy to offer more or less return of post despatch. Transform keyboards are available via mail order from Transform Ltd, 41 Keats House, Portchester Mead, Beckenham, Kent. Remember to add £2 for postage and packing.



The transformation is impressive indeed — along with a separate key pad, Transform's keyboard also allows the facility to easily fit additional Microdrives.

TOP TEN TURKEYS

Well, here they are — the packages you voted the most turkeyish on the Spectrum. The form you have to fill in to make your vote is on the Top 20 page — check it out and send it off. As an incentive, if you do tell us what your top turkeys are, we'll let loose the secret of whose warped mind was behind *Maze Panic* by Silicon Software (won't we, Trouble-makin' Pete!).

But enough of this, here they are:-

1
Transylvanian Tower
Richard Shepherd Software

2
Schizoids
Imagine Software

3
3D Tunnel
New Generation Software

4
Yomp
Virgin Games

5
Nightflight 1
Hewson Consultants

6
Molar Maul
Imagine Software

7
Mad Martha 1
MicroGen

8
Dungeon Master
Crystal Software

9
Zip Zap
Imagine Software

10
Maze Panic
Silicon Software

OK that's it for this month. Before you forget, look out the Top 20 charts and fill in that form — ya hear!

THE YS TOP 20

Here we go again. The YS Top Twenty, as prescribed by the *YS*-reading public at large — no chart-fixing here.

Yet again, a name has been pulled out of the hat by our editor and this time, the pathetic prize of three new software titles goes to Andrew Porter of Derriaghy, Lisburn. Remember, just keep sending in those polling slips and you too could bear the brunt of our outstanding meanness.

This month, you can also see the first collection of Top Ten Turkeys which, as it turns out, is not much different to our original all-time Turkey Awards for 1983. You'll find them in Frontlines — but if you've got an all-time least favourite game, fill in the coupon below and send it off quick.

If you take a good look at the coupon this month, you'll probably notice we've added a section — we now not only want you to tell us your top five raves, your top three turkeys, your name and address (whew!) ... but we'd also like to know why (in not more than 20 words) you've voted your favourite game to Number One. What for? We want to publish 'em, of course!

YS TOP 20 READER POLL

My top five raves on the Speccy are:

1 ______________________
2 ______________________
3 ______________________
4 ______________________
5 ______________________

My bottom three turkeys on the Speccy are:

1 ______________________
2 ______________________
3 ______________________

Yes, I'm convinced my vote is a major contribution to the Editor's insanity.
Stick in a pillar box as quick as pos', with your envelope addressed to:

YS TOP TWENTY
YOUR SPECTRUM
14 RATHBONE PLACE
LONDON W1P 1DE

YS TOP TWENTY CHART

This Month	Last Month	Months in chart	Title / Software House	Comment
1	1	3	**JET SET WILLY** SOFTWARE PROJECTS	STILL GOING STRONG ... WILLY VERSUS THE ATTIC BUG — HACKERS LOVE IT!
2	2	4	**MANIC MINER** SOFTWARE PROJECTS	THE FIRST INCARNATION OF MINER WILLY AND STILL A HOT FAVOURITE WITH THE VOTERS. STUNNING AND BIZARRE.
3	5	4	**LUNAR JETMAN** ULTIMATE	ARCADE ADVENTURE OF THE LUNAR KIND — MOON MADNESS ON THE FROZEN WASTES.
4	3	3	**SCUBA DIVE** DURELL	SLIP ON A WETSUIT AND DIP INTO DURELL'S TALE OF TREASURE 'NEATH THE ICY WAVES.
5	13	4	**JET PAC** ULTIMATE	FIRST, SOME SPACESHIP DIY, THEN GET CRACKING ON SOME INTERSTELLAR WHEELING AND DEALING.
6	6	4	**ANT ATTACK** QUICKSILVA	INSECTERAMA — IN LIVING 3D! ENTERTAINING EPIC IN THE RUINS OF ANTESCHER.
7	NEW	2	**TRASHMAN** NEW GENERATION SOFTWARE	AN ORIGINAL GRAPHICS ARCADE GAME WHICH HAS YOU GRABBING GARBAGE AND FIGHTING CYCLISTS AND DOGS.
8	7	4	**CHEQUERED FLAG** PSION	REV UP FOR THE GREAT GRAND PRIX CIRCUS AND RACE AROUND SOME OF THE MOST DEMANDING TRACKS IN THE WORLD.
9	4	4	**ATIC ATAC** ULTIMATE	GRAPPLE WITH SPOOKS IN A FULL GRAPHIC ADVENTURE THAT TAKES ITS SPIRIT FROM THE ARCADE WORLD.
10	8	4	**FIGHTER PILOT** DIGITAL SYSTEMS	FORGET JUMBOS ... THIS GAME HAS YOU JETTING AROUND IN YOUR OWN FIGHTER — ALL IN GLORIOUS 3D!
11	9	4	**DEATHCHASE** MICROMEGA	'RETURN OF THE JEDI' LIVES! A SOFTWARE RECREATION OF THE EPIC 'ON YER BIKE' CHASE SCENE.
12	NEW	2	**FOOTBALL MANAGER** ADDICTIVE GAMES	FIGHT YOUR WAY THROUGH TO THE LEAGUE AND FA CUP FINALS.
13	10	2	**WHEELIE** MICROSPHERE	IT'S HIM OR YOU ... STEER YOUR BIKE THROUGH THE TWISTING MAZE AND ESCAPE THE GHOSTRIDER.
14	NEW	1	**MAZE DEATH** PSS	RACING YOUR CAR AROUND A MAZE — A FATAL MOVE MAY BE AROUND THE CORNER.
15	20	3	**CHUCKIE EGG** A&F SOFTWARE	COLLECT THE EGGS BEFORE THE MEANIES EAT UP ALL THE CORN.
16	15	2	**FRED** QUICKSILVA	ARCHAEOLOGIST FRED NEEDS HELP GETTING OUT OF THE KILLER CAVERNS.
17	NEW	2	**VALHALLA** LEGEND	THE NEAR LEGENDARY NORSE ADVENTURE IN GLORIOUS TEXT AND GRAPHICS. A STRAIN FOR ANY BRAIN.
18	NEW	1	**BUGABOO** QUICKSILVA	TAKE THE PART OF A FLEA IN THIS HIGHLY GRAPHICAL ARCADE-TYPE GAME.
19	12	3	**ALCHEMIST** IMAGINE	AN ADVENTURE/ARCADE HYBRID THAT HAS YOU DABBLING IN SORCERY.
20	NEW	1	**BLADE ALLEY** PSS	SIX CHALLENGING SCREENS OF ASTEROIDS, TIE FIGHTERS, SAUCERS, SPACE HOPPERS. BANKING SPACESHIPS AND MOVING 3D SCENERY.


1984
QUICKSILVA

FORUM

Is there something you're not telling us? Write to Forum, *Your Spectrum*, Rathbone Place, London W1P 1DE.

AT THE END OF THE LINE...

There's a printing blotch on page 109 of *YS* issue 3, in the listing of Andy Wright's *REM Remover* program. I just can't make out the last entry in line 1040 — a data statement for the necessary machine code.

Please can you give me the details of this line so that I can key it in?

RM Aitken, Camberley

Camberley eh? Well, that puts you in the thick of all the action! As to your query, the line should have looked like this:

```
1040 DATA 229,35,6,0,35,126
254
```

Sorry 'bout that. But while on the subject of Program Power, or Play Power as it used to be known, I have a cheque on my desk for Richard Archdeacon for his contribution, Hopalong. Unfortunately, I've lost your address, so please write to me and I'll send off your money plus something to compensate you for the long wait. Ed.

QL CONTENTMENT?

The QL computer, which I ordered on 25th January, was delivered early last week, thus just about making the original 'end of May' delivery date. Unfortunately I've been so busy marking examinations lately it's only given me a short time to try it out — but I'm very impressed with its performance so far. The stippling effect to give multiple different paper colours is particularly pleasing — especially since the manual implies that this doesn't work on the TV output. Using the QL on a TV is quite acceptable — although not as good the monitor which we were able to borrow for a short time.

However, as you might expect, I do have a few 'why don't they' quibbles. One small point, but unnecessary and irritating, is why Sinclair Research don't punch the holes in the manual at the identical spacing as the folder provided. Mine are not quite correctly spaced, so I have to ease the pages across instead of turning them easily.

My next task will be to make myself a reference card of SuperBasic commands, because the manual isn't that easy to follow when you are actually trying to design a program. It would have been a useful extra to have received in the original package — perhaps some enterprising company out there will come to my rescue.

Perhaps you could help me in my investigations for a suitable monitor which is compatible with the QL? I'm also looking into the possibilities of using a printer via the RS232 interface — but this is a bit less urgent (my bank manager will throw a wobbler if I spend much more!).

S Laflin-Barker, Birmingham

We're very pleased to hear you've got your QL at last; this is where the fun begins! The only people we've come across that can supply you with the peripherals you require are Quantum Leap Systems. They are selling a Brother HR5 Printer in matching QL black with mains adaptor, leads, etc, for £189 inclusive. They also have a choice of two matching black 12-inch monitors; the monochrome version for £99 and the RGB colour version for £299, including interface and all necessary leads. These are available only to QL owners from QL Systems, 68 Foxwood Close, Feltham, Middlesex TW13 7DL. Dep. Ed.

HOW D'YA DO IT?

I would like to take this opportunity to congratulate you on a superb publication. Keep it up! I am writing to ask if you would most kindly send me the listing for the program which drew the Spectrum on the cover of issue 4.

May I also make a suggestion? Perhaps you could run a series entitled 'Classic Spectrum Games' and include a poster showing the games' screen display. Speaking of classic games I was most interested in your article on *Jet Set Willy* (issue 4). As an even lesser mortal than the person who wrote it, I wondered how he achieved the unlimited lives effect. I wonder if he would divulge the secret?

Many thanks again for a magazine devoted entirely to the Spectrum.

Philip Stanley, Altrincham

Well, Philip, if you take a quick look through the mag, you'll come across Andrew Pennell's Hacking Away article which should broaden your outlook on JSW, and hopefully the Spectrum as well. As for the cover of issue 4, I'll let Troubleshooting Pete fill you in on that — he's been wanting to tell someone how hard we make him work here for months! Ed.

Too true! A couple of days before that particular issue had to go to the printers, our art department decided they wanted a picture of a Speccy, drawn by a Speccy, for the front cover — instead of the planned (and already photographed!) picture of Jet Set Willy. To create the picture, Ian (our photographer) and yours truly, worked solidly for over 12 hours with Melbourne Draw. Unfortunately, we don't have enough spare magazine space to print 7K of code, and I really don't think it would be the easiest thing to type in anyway. Troubleshootin' Pete.

SEE WHERE GROVELLING GETS YOU

Although I'm not new to the world of computers, I am an apprentice on Sinclair Research's (so affectionately named) 'Speccy'! So, after an initial play, on went my coat and down to the newsagents I went to look for a magazine to help me master my new baby. After reading all the magazines in the shop I decided to bring home my first copy of *Your Spectrum*, which I proceeded to read from cover to cover.

Suitably impressed I again ventured from my front door in search of back copies since the issue I had was number 4. Well, after searching high and low I located numbers 2 and 3, but not number 1. Disheartened I went home and read 2 and 3, learning all sorts of new and exciting things I could do with my Spectrum . . . sorry . . . 'Speccy'! It seems, though, that I'm not the only unfortunate person bereft of issue number 1 so I've decided to write to see, grovel, grovel, if I could

possibly, grovel, grovel, have a copy, grovel, grovel, of issue 1, grovel . . . etc. Please, please could you tell me where I send off for one and how much it will cost me? If you don't do this for me, when I'm 97 I'll be very angry with you when my collection of 904 copies of *Your Spectrum* has issue number 1 missing!!!
CB Backhouse, Nottingham

Ah ha! We know how old you are! If you think we're gonna' care about your missing copy after we've published 905 of them, you're really in need of medical help (probably about as much as us!). Truth is, any normal person can get back issues from us. Just send £1.10 for each copy you want, stating the issue number to: Back Issues, Your Spectrum, 14 Rathbone Place, London W1P 1DE. However, CB Backhouse is obviously a past master at grovelling and so gets issue 1 free! Ed.

KEYBOARD QUESTIONS

I wonder if you could help me? I am thinking of changing my Spectrum keyboard, but not sure which make to buy. Could you tell me which you think is the best value at the moment? Thank you.
Carl Ferreira, Middlesbrough

There are plenty of keyboards on the market for you to choose from, and here are a few to keep you going. The Fuller FDS keyboard is manufactured by Fuller Microsystems and costs £49.95; you can contact them on 051-709 9280. For the same price you can have the Lo-Profile from AMS, and their telephone number is 0925 602690. At £45 there's the Spectrum Keyboard from Dk'Tronics, telephone 0799 26350. If you want to pay considerably less than this, how about the K-Board from Kelwood Computing on 0709 63242; their board costs £28.50. We will be publishing a full comparison of all the available keyboards in a future issue, so look out for it. Troubleshootin' Pete.

TAKING THE TEDIUM OUT OF TAPPING

Though just starting with a 48K Spectrum at nearly retiring age, I really appreciated the ZIP code program. It's so beautifully structured and an architectural delight to read — even though many of the actual operations are beyond me.

Needless to say, I made mistakes in typing in the program and, imitation being the sincerest form of flattery, I devised the following (structured??) 14-line program to enable me to check the ZIP (or any other magazine) program with its article one line at a time — without the screen being littered with other program lines. The mix-up between lines 6535 and 6575 in the magazine posed a slight problem, but it was soon evident where everything went.

The program lists each line separately and can do so consecutively or can jump forwards or backwards to any given line showing bytes used each time. Note that the 'jump' command will jump forwards or backwards using initial variable 'a1'. Enter GO TO 4986 as a direct command to start the program.
Don Smith, Kirkbymoorside

```
4986 LET peekline=4997: LET peeklen=4998
: LET next=4999: LET ask=4988: LET scan=
4992: LET a=PEEK 23635+256*PEEK 23636: L
ET a1=a
4987 GO SUB next: CLS : PRINT AT 6,0;"Pr
ess 1 for 1st line & ALL cons-ecutive li
nes"''"press j to jump lines, followed b
y line No. required"
4988 PAUSE 0: GO TO (4989 AND INKEY$="j"
)+(4991 AND INKEY$="1")
4989 INPUT "Line No?";n: LET a=a1: GO SU
B next
4990 IF n<>line THEN  LET a=nextl: GO SU
B next
4991 CLS : PRINT AT 5,0;line;: LET a=a+4
4992 IF PEEK a=14 THEN  LET a=a+6
4993 IF PEEK a=13 THEN  GO TO 4995
4994 PRINT CHR$ PEEK a;: IF PEEK 23688=1
 THEN  PRINT '': REM This double spacing
 is upset by end-line commands
4995 LET a=a+1: IF a>=nextl THEN  LET a=
nextl: PRINT '''TAB 10;len+4;" bytes": G
O SUB next: GO TO ask
```

Use this to check exactly where you are when typing in a listing.

SHORT CUT TO AMAZE

Toni Baker has a marvellous knack of coming up with something fresh and her *Maze* program, in issue 4 of *Your Spectrum*, is no exception. However, those of us (like me) who were a bit daunted by the idea of *correctly* keying in 1024 Hex pairs might revive their spirits with this little routine, which automates the operation as much as possible.

Looking at the ranks of numbers — like Napoleon's army on the march — I thought, "I'll never do it". "It's worth getting a friend to help", she says; so why not use our friendly Speccy?

Look carefully at it. First, all the numbers start with a '9', so that's something the computer can look after; there's no point wearing your own fingers out doing the same thing over and over again. That's one of the things computers are for!

Secondly, it's much easier to keep in the correct place if you arrange to enter the numbers in rows of eight, to match the printout in *Your Spectrum.*

Thirdly, it would be nice to have the computer keep the score, by getting it to print out the line and column numbers as it goes along — another thing it's good at.

So here's the result of a short session at the keyboard. It enabled me to key in all 1024 bytes in about half an hour. You can go back and correct a section by entering, GOTO 200 as a direct command and then INPUTing the line number on cue. I'm confident enough of the result to think there are some glitches in the listing in the last few lines, but I don't know exactly what they should be to get a properly drawn pattern. Also, there's a misprint in the code listing: 'ED 5B B1 5C', half-way down page 22, should be 'ED 5B B0 56', in order to load the x co-ordinate.

Anyhow, all mazes baffle me, even when printed out in full — let alone seen in bits through a square keyhole!
John Durst, Swerford, Oxon

```
   1 POKE 23658,8: CLEAR 57340
   5 LET col=0: LET lin=1
  10 LET col=col+1: IF col=9 THEN LET c
ol=1: LET lin=lin+1: CLS
  15 PRINT AT 10,0;"MAZE DATA -"'"next
entry: Line ";lin;" Entry ";col
  20 IF INKEY$="" THEN GO TO 15
  30 LET n=CODE INKEY$
  40 IF n=13 THEN STOP
  50 IF n=45 THEN LET col=col-(col>0):P
RINT OVER 1;AT 13,0;TAB 4+3*col; OVER 0;
"   ":GO TO 110
  60 IF NOT ((n>=48 AND n<=57) OR (n>=6
5 AND n<=70)) THEN GO TO 10
  70 LET n=n-48-7*(n>=65)
  80 PRINT AT 13,0;"Entry:"; OVER 1; TA
B 4+3*col; OVER 0;" 9";INKEY$
  90 POKE 57343+col+8*8(lin-1),n+16*9
 110 IF INKEY$<>"" THEN GO TO 110
 120 GO TO 10
 199 STOP
 200 INPUT "lin";lin:LET col=0
 210 PAUSE 10: GO TO 10
>
```

Make the Spectrum do the work when keying in lots of Hex pairs.

IN TROUBLE

Further to the letters by R P Taylor (*YS* issue 3) and Mike Minchen (*YS* issue 4), I would like to point out that this problem regarding the values of the IN command is not just common to issue 3 models. For months I've been unable to fathom out where I'm going wrong with the programming of my Issue 2 model. I've written to Sinclair Research twice but have got no reply.

A few of my friends with Issue 2 models are experiencing the same problem, and it would seem that Sinclair Research failed to inform customers of a design change.
Tony Ivanov, West Lothian

This seems to be a common problem — and I've received quite a few phone calls on this one. Take a look at my column in Frontlines for a suggested solution. Troubleshootin' Pete.

SUBCONSCIOUSNESS



Fantasise over features . . .



Marvel at machine code . . .



Revel in reviews . . .



Lust over listings . . .

If you recognise any of the critical conditions portrayed above, then you're probably a lost cause as far as computing goes — admit it, you're hooked! And, as a devout follower of Sir Clive's wonder machines, you don't want to miss out on one of the best cures around (our magazine carries no Government health warning).

You've doubtless heard the rumour that you'll always be able to take a stroll down to your local newsagents and pick up a copy of *YS*, no problem? But the fact is that *Your Spectrum* issue one sold out so fast, we're still getting calls from people anxiously pulling their hair out trying to secure a copy. Really!

So, that's why this month, we're kicking off our *Speccy Subs* service. For just £12 (in UK and Northern Ireland only — it's a little bit more for Europe and Air Mail) you can guarantee that each issue will come thudding through your door each and every month.

All you have to do is fill in the attached coupon (or a photocopy of same) and unlock your chequebook. Of course, if you're a credit card king, just give us your number and we'll do the rest — that'll do nicely.

YS PRIORITY ORDER FORM

I would like to subscribe to *Your Spectrum and QL User* for the next 12 issues, starting with the .... issue.

I enclose a cheque/postal order made payable to Sportscene Specialist Press Ltd for (tick the appropriate box):

☐ £12 (UK and Eire)
☐ £15 (Europe) ☐ £25 (Airmail)

Or please charge my Access/Visa/Diners/American Express card (please delete where applicable).

Account Number ______________________

Name: ______________________

Address: ______________________

____

____

______________________ Postcode ______________________

(please use block capitals)

Send the completed coupon plus payment to **Speccy Subs, Your Spectrum, 14 Rathbone Place, London W1P 1DE.**

If you don't want to deface your magazine please make a photocopy of this order form.

JET SET WILLY

HACKING AWAY

We've had so many pleading letters and phone calls asking for the POKEs* Andrew Pennell *used to 'enhance'* Jet Set Willy *. . . that we just had to publish them. That, and the multitude of suggestions sent in by our faithful readership!

We're feeling a bit overwhelmed at the response to our revelations on *Jet Set Willy* in issue 4. In fact, the multitude of letters divide into two distinct groups — the naughty hackers, who've blythely supplied all the POKEs you should never have needed in the first place, and those on the straight and narrow who simply wanted to know the required locations. A few correspondents even offered money, but you can't bribe me (at least, not easily!)

First, let's have a look at the POKEs that I mentioned:

POKE	Effect
34785,x-1	'x' lives (maximum 32)
35899,0	Infinite lives
34795,x	Start at room x (you normally start in the Bathroom which is x=33)
41983,256-x	The number of objects (normally x=83)

Note that the missing POKE is the anti-protection one, which I'm not giving for obvious reasons. From the correspondence I've had, it seems as though everyone has a different one — but they're all variations on a theme.

JUMP TO IT

For those who don't know how to break into *JSW,* I have included a general loader program that can be altered to

```
 10 INK 7:PAPER 1:BORDER 1:CL
EAR 32767
 20 PRINT "JSW is loading"
 30 LOAD ""CODE
 98
 99 REM POKEs after here
898
899 INPUT "Press ENTER to sta
rt"; LINE A$
900 RANDOMISE USR 33792
```

A general loader program for *Jet Set Willy* — simply insert whatever POKEs you want between lines 100 and 700.

allow to you to add your favourite POKEs. Insert any extra line, from lines 100 to 700, RUN it, then play the *JSW* tape.

Quite a few readers asked about the mysterious 10-letter code that allows room jumping, so here is the secret: go to the First Landing and get on to the lowest level — the floor. Then type in the letter

ROOM NUMBER	ROOM NAME	THE COMBINATION OF KEYS REQUIRED						
0-	The Off Licence							9
1-	The Bridge	1						9
2-	Under the MegaTree		2					9
3-	At the Foot of the MegaTree	1	2					9
4-	The Drive			3				9
5-	The Security Guard	1		3				9
6-	Entrance to Hades-		2	3				9
7-	Cuckoo's Nest	1	2	3				9
8-	Inside the MegaTrunk				4			9
9-	On a Branch Over the Drive	1			4			9
10-	The Front Door		2		4			9
11-	The Hall	1	2		4			9
12-	Tree Top			3	4			9
13-	Out on a Limb	1		3	4			9
14-	Rescue Esmerelda	1	2	3	4			9
15-	I'm sure I've seen this before...	1	2	3	4			9
16-	We must perform a Quirkafleeg					5		9
17-	Up on the Battlements	1				5		9
18-	On the Roof		2			5		9
19-	The Forgotten Abbey	1	2			5		9
20-	Ballroom East			3		5		9
21-	Ballroom West	1		3		5		9
22-	To the Kitchens — Main Stairway		2	3		5		9
23-	The Kitchen	1	2	3		5		9
24-	West of Kitchen	1			4	5		9
25-	Cold Store	1			4	5		9
26-	East Wall Base	1	2		4	5		9
27-	The Chapel	1	2		4	5		9
28-	First Landing			3	4	5		9
29-	The Nightmare Room	1		3	4	5		9
30-	The Banyan Tree		2	3	4	5		9
31-	Swimming Pool	1	2	3	4	5		9
32-	Halfway up the East Wall	1					6	9
33-	The Bathroom	1					6	9
34-	Top Landing		2				6	9
35-	Master Bedroom	1	2				6	9
36-	A Bit of Tree			3			6	9
37-	Orangery	1		3			6	9
38-	Priests' Hole		2	3			6	9
39-	Emergency Generator	1	2	3			6	9
40-	Dr Jones will never believe this				4		6	9
41-	The Attic	1			4		6	9
42-	Under the Roof		2		4		6	9
43-	Conservatory Roof	1	2		4	5		9
44-	On Top of the House	1		3	4		6	9
45-	Under the Drive	1		3	4		6	9
46-	Tree Root	1	2	3	4		6	9
47-	[	1	2	3	4		6	9
48-	Nomen Luni	1	2			5	6	9
49-	The Wine Cellar	1	2			5	6	9
50-	Watch Tower	1	2			5	6	9
51-	Tool Shed	1	2			5	6	9
52-	Back Stairway			3		5	6	9
53-	Back Door	1		3		5	6	9
54-	West Wing		2	3		5	6	9
55-	West Bedroom	1	2	3		5	6	9
56-	West Wing Roof	1			4	5	6	9
57-	Above the West Bedroom	1			4	5	6	9
58-	The Beach		2		4	5	6	9
59-	The Yacht	1	2		4	5	6	9
60-	The Bow	1		3	4	5	6	9

Once you've typed 'WRITETYPER' in 'The First Landing', here's the combination of keys you'll need to use to whisk yourself around the rooms.

JET SET WILLY

HACKING AWAY

sequence 'WRITETYPER', making sure all the time that Willy doesn't wander up the ladder; he has to stay on the floor for it to work. That done, test it by holding down the '6' key; if you've done it correctly, you'll have warped your way into the Off Licence. To jump to other rooms, you hold combinations of the keys '1' to '5', along with the '6' key, where keys '1' to '5' correspond to the binary of the room number, as in *Manic Miner*. Beware though, because some combinations will crash the program, and some rooms are unobtainable. If the entry procedure seems too tedious, POKEing 34275,10 will activate it for you.

However, for those not interested in the finer points of actually playing the game and who want to see the final sequence of events when you have collected all of the objects, wait no longer. To see the final head-wetting effect, select one object by POKEing 41983,255 (which just happens to be the tap), collect it, get along to the Master Bedroom, and hey presto — Willy's strange predictions will be revealed!

But . . . shock horror, there was a mistake in the original article. On the first page above the map you'll find a very inaccurate paragraph — for which I deny all responsibility (*Why's everybody always picking on me. Ed.*). For the record, there are 79 visible objects, two of which count as double, and two invisible ones in the landing and swimming pool, making a total of 83 in all.

THANK YOU PEOPLE

Time now to credit those souls who supplied even more useful locations, starting with **Mike Stockwell.** He was the first with an 'anti-Attic' POKE, which he worked out during the last Microfair! His POKE is 59900,255 and it works like a dream. I should also mention **Julian O'Dell,** who also found it, but a bit later, and **Jim Duncan** who fixed it in a different way. In fact, all three worked out easier ways of doing it than the official Software Projects POKEs — well done guys!

Next hacker was **JM Dodds,** who supplied the following info: POKEing zero into locations 39998 through 40191 deletes the Monty Python foot, the barrel and the dreaded Maria, and zeroing from approximately 46896 to 49171 will delete the rest of the deadly moving graphics including those in the Banyan Tree and the Forgotten abbey — thanks very much JMD. **Andrew Cole** showed another way of making life easier, by zeroing locations 34808, 34809, 34811, 34812, 34814, 34815, 37425-7, and 40064-40191. **Tim Cannop** supplied 35123,0 to obliterate everything that moves, and 38240,0 is an alternative way of dispatching Maria. The joke is that even with no baddies, I still can't do the Banyan Tree properly.

David Harris wrote in to reveal that POKEing 34785 determines the number of lives, from one to 32. He also related a very interesting story about one of his friends. Aparently, after being fobbed off by Software Projects response to *JSW* enquiries, the unnamed friend pretended to be Bruce Everiss, Director of Imagine. This partly succeeded, but eventually failed when a fairly high-up employee who knew the real Mr. Everiss, unfortunately spotted the charade; good try anyway! Sincere thanks to to **Malcolm Cole,** who revealed that POKE 36477,1 stops you dying when you fall a great height — a great piece of hacking Malcolm. With this timely POKE, for instance, you can enter the Conservatory Roof from Under the Roof, without having to negotiate the dreaded Banyan Tree.

And still they come! **John Green** revealed how to get the object in the First Landing, using the 'WRITETYPER' method. First, either do the POKE or type the sequence, then go to the 'To Kitchesn Main Stairway' room, and stay on the stairs on the left of the deadly snowflake. Next, hold keys '3', '4', '5' and '9' down simultaneously, and you should appear in the side of the wall in the first landing — and your object count will go up by one. How you get down without dying I leave to your imagination!

Talking of 'WRITETYPER', **CW Else** explained why the keyboard hardware messes it up, and also how to get *JSW* to work with the Interface 2 — by POKE 36635,239. **Dominic Neal,** a tender 15-year old, supplied POKE 36545,0 which makes the Banyan Tree just a little bit easier. Using it, go to the left of the tree and get to the third pillar; from there you will be usefully sucked up into Bit of Tree, and hence into the elusive Conservatory. Dominic also gave POKE 36358,0 which turns Willy into a 'Super Willy', giving him jumping powers reminiscent of Zebedee. **Darren Appleby** must have been kicking himself as a few days before *YS* issue 4 came out he'd posted us a nice map of *JSW* that he'd done himself — sorry Darren, but I beat you to it!

Since writing the original article, we think we've discovered the reasons for some of the strange screen names. Nomen Luni is a mickey-take of the logo used on Imagine's *Zzoom* — Nomen Ludi (presumably Latin for something or other). The Dr Jones screen has something to do with the pink elephant, but I'm still not really sure of that link! The word 'Quirkafleeg' derives from a chant taken from a book called *The Adventures of Fat Freddy's Cat #5*, sent to us by **Robin Coles.** It seems that performing a Quirkafleeg involves laying on your back with your feet in the air, in the presence of dead furry animals — strange books you read Robin. Originally the screen was called The Gaping Pit, but this got changed at some stage.

FIRST STEPS IN HACKING

Quite a few trainspotters have written in asking how they can become 'hackers'. OK — here are my tactics (though I'm sure everyone does it differently). First a knowledge of machine code and a good disassembler are vital; for the latter I use the Hisoft *MONS*.

The first move in hacking is to break into the program — which can range from the simple to the near impossible. *JSW* is actually simple, as you MERGE the first bit of Basic, CLEAR 32767, then LOAD CODE and restart the tape. Hey presto, the code is in the machine, and using a header reader program (like the one in *YS* issue 4) you can find exactly where the code lies. In *JSW* it's from 32768 to 65535. That done, you need to find a suitable place to put your disassembler; on *JSW* I find 26000 convenient.

If you've got this far, well, now comes the difficult bit . . . examining the software for recognisable statements that are alterable. As an example, here's how I found the 'infinite lives' POKE. The usual way for decreasing the lives counter in any Z80 game is with a DEC (HL) instruction, so I searched carefully for all occurances of the byte $35. As each byte was found, I disassembled the bytes around it, to ensure it was program and not data, and made note of the LD HL instruction before each DEC. That list of addresses was then further examined to see which ones got initialised to eight, the starting number of lives. As it turned out, none of them did, so I searched for initialisation to seven and struck lucky. Once I'd found the HL value, I worked backwards to find the relevant DEC (HL) instruction, then NOPped it out by POKEing it with zero. That's all there is to it folks!

```
 99 REM SAVE as SCREEN$
100 RESTORE 150
110 POKE 35538,191:POKE 35600
,14:POKE 35601,254
120 POKE 34997,0:POKE 34998,0
:POKE 34999,0
130 FOR i=35547 TO 35590
140 READ a:POKE i,a:NEXT i
150 DATA 253,229,221,229,221,
33,237,255,17,17,0,175,205,19
4,4,6,50,118,16,253, 17,0,27,6
2,255,221,33,0,64,205,194,4,2
43,221,225,253,225,14,254,0,0
,0,0,0
```

This listing allows SCREEN$ to be saved at any time during the game, simply by pressing the 'S' key.

```
 99 REM correct pause bug
100 RESTORE 150
110 POKE 35591,195:POKE 35592,
240:POKE 35593,255
130 FOR i=65520 TO 65535
140 READ a:POKE i,a:NEXT i
150 DATA 197,33,0,154,17,0,90,
1,0,1,237,176,193,195,18,139
```

This patch cures the 'pause' bug which affects Interface 1 jet-setters.

The general method for any such hacking is to search for expected op codes, but it can take a long time. There is another method, which I think a few correspondents used, known as 'random POKEing';

however, this can be rather a hit and miss affair. Be patient — to find all the POKEs above took a lot of time, a lot of work, and a large quantity of listing paper. But it's been worth it.

WILLY'S BLUES

Good as the game is, there are some bugs in *JSW.* The Attic 'feature' is really an accidental consequence of a faulty byte in the sprite data, and you've probably found the way you can lose all of your lives (even infinite ones) by dying in the wrong place at the edge of the screen. Interface 1 owners will also know that pressing a key to pause the program, in fact, pauses it forever — the whole thing locks up. It is caused by a read of port 0, (which actually locks the machine up rather well) in turn caused by a missing LD C,$FE instruction. A mysterious correspondent known only as **IAC** has suplied a program that corrects the bug, and it is included in this article in a form you can add to the loader already given.

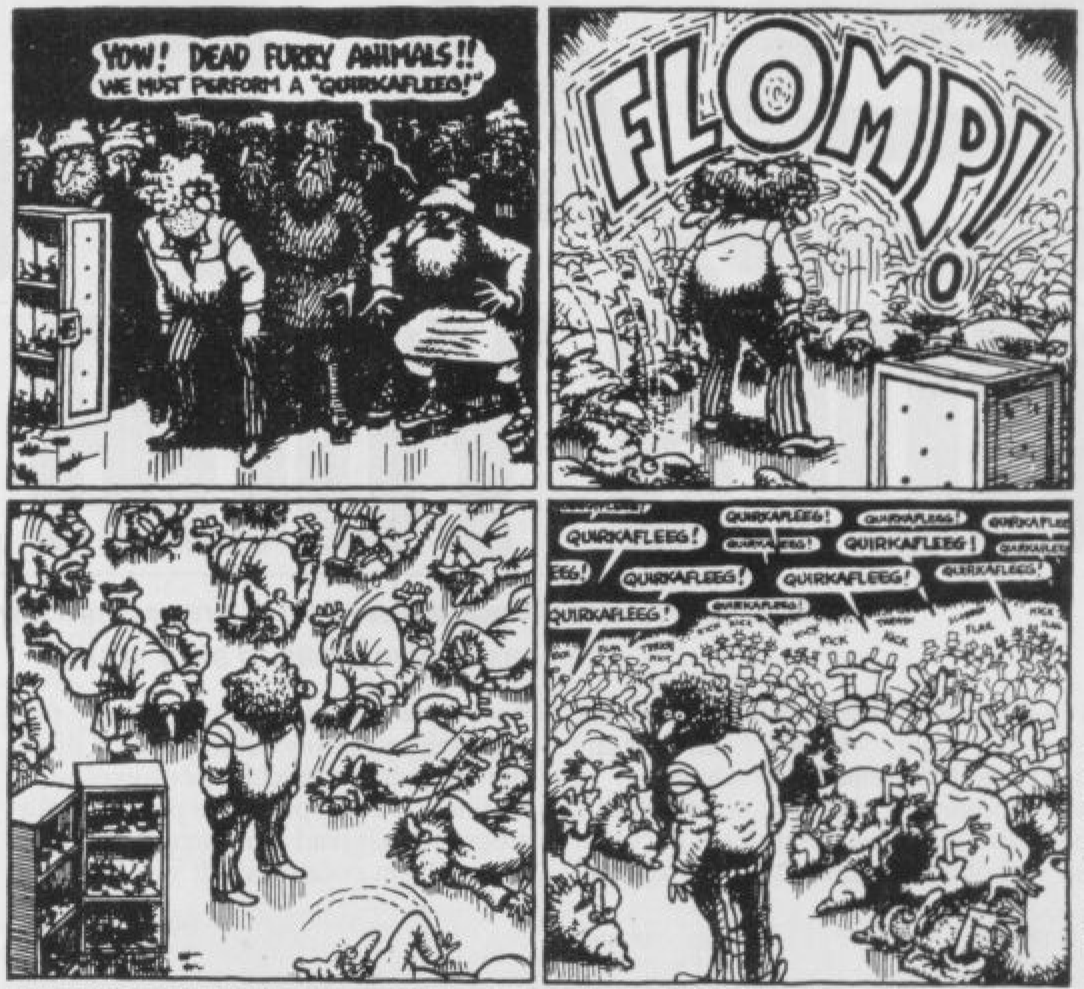
The very top few K of *JSW* consists of code that addresses a complex piece of hardware, and now I've found out what it is — it's actually the TRS-DOS, copied straight from the TRS80 that Matthew Smith used to write *JSW;* this is thus a handy place to put any patches or mods, or even some extra screens.

SCREEN DREAMS

To end this article on a high spot, I've also provided a listing to enable SCREEN$s to be taken from the program and stored on cassette.

Thus, at any time during the game, pressing the 'S' key will save the screen to tape, but be sure to start recording before you press it.

Although this has so far only been involved with *JSW,* consider it open for hacking business of any kind — how about having a go on *Lunar Jetman, Trashman* or *Chuckie Egg?* YS



Here's the inspiration for the room 'We must perform a Quirkafleeg' — courtesy of *The Adventures of Fat Freddy's Cat*, issue 5.

BANG GOES YOUR CODE

Has the razzle-dazzle gone out of your programs?* Simon Lane's *got some explosive ideas to stun you. . .

Have you ever had that feeling of anti-climax when, having successfully obliterated an alien (or whatever) in some otherwise superbly written Basic program, it simply disappears into thin air without any kind of graphic reward? Well, now you'll be able to remedy this omission by simply calling one of these interrupt-driven machine code explosion routines at the appropriate point in your program. Just read the instructions, type in the object code, and off you go.

```
FDFF                  ORG   #FDFF
FDFF 16FE             DEFW  MCEXP
              ;Initialise variables and interrupts
FE01 AF       GO      XOR   A
FE02 32D8FE           LD    (DONE),A
FE05 32DAFE           LD    (SIZE),A
FE08 32DFFE           LD    (INOUT),A
FE0B 3C               INC   A
FE0C 32D9FE           LD    (COUNT),A
FE0F 3EFD             LD    A,#FD ;This makes the Z80 jump to the sub
FE11 ED47             LD    I,A   ;routine whose address is stored at
FE13 ED5E             IM    2     ; FDFF each time an interrupt occurs
FE15 C9               RET
              ;This code is executed every 0.02 secs
FE16 C5       MCEXP   PUSH  BC
FE17 D5               PUSH  DE
FE18 E5               PUSH  HL
FE19 F5               PUSH  AF
FE1A DDE5             PUSH  IX
              ;Draw an octagon every (SPEED)/50 secs
FE1C 21D9FE           LD    HL,COUNT
FE1F 35               DEC   (HL)
FE20 C2A4FE           JP    NZ,RET
FE23 3AD7FE           LD    A,(SPEED)
FE26 77               LD    (HL),A
FE27 2AD4FE           LD    HL,(XPOS)
FE2A 3ADAFE           LD    A,(SIZE)
FE2D A7               AND   A
FE2E 2005             JR    NZ,NOTO
              ;If (SIZE)=0 then plot a single point ...
FE30 CDADFE           CALL  PLOT
FE33 1848             JR    ENDPLT
              ;... otherwise draw an octagon of the appropriate size
FE35 5F       NOTO    LD    E,A
FE36 57               LD    D,A
FE37 CB3A             SRL   D
FE39 19               ADD   HL,DE
FE3A 1100FF           LD    DE,#FF00 ;Down
FE3D DD21E0FE         LD    IX,DIRTAB
FE41 0E04             LD    C,4
FE43 FE01     MLOOP   CP    1
FE45 2809             JR    Z,NOGO
FE47 47               LD    B,A
FE48 CB80             RES   0,B
              ;Draw straight line
FE4A 19       STRT    ADD   HL,DE
FE4B CDADFE           CALL  PLOT
FE4E 10FA             DJNZ  STRT
FE50 47       NOGO    LD    B,A
FE51 04               INC   B
FE52 CB38             SRL   B
FE54 ED53DBFE         LD    (DE1),DE
FE58 DD5E00           LD    E,(IX+0)
FE5B DD5601           LD    D,(IX+1)
FE5E ED53DDFE         LD    (DE2),DE
              ;Draw diagonal line
FE62 19       DIAG    ADD   HL,DE
FE63 CB47             BIT   0,A
FE65 CCADFE           CALL  Z,PLOT
FE68 ED5BDBFE         LD    DE,(DE1)
FE6C 19               ADD   HL,DE
```

The assembly language listings have been produced using the Hisoft *GENS* assembler, which uses a '#' symbol to denote Hex numbers. If you have an assembler you can type in the source code and assemble it yourself. This will allow you the added joy of making your own alterations to the programs — certainly, it's a lot less boring than entering the object code straight. However, without an assembler this is exactly what you will have to do — using either a suitable monitor program, or the short Hex loader provided as a last resort.

To use the Hex loader, first you'll have to enter the start address (in decimal) as given in the instructions for each routine; that has to be followed by all the Hex object code given in column two of the assembler listing. For example, to enter

```
 10 REM ************************
 20 REM HEX LOADER
 30 REM ************************
 40 DEF FN d(h$)=CODE h$-48-(32
 AND h$>="a")-(7 AND h$>="A")
 50 INPUT "Start-address:";l
 60 INPUT (l);">";h$
 70 POKE l,FN d(h$(1))*16+FN d(
h$(2))
 80 LET l=l+1: LET h$=h$(3 TO )
 90 IF h$>"" THEN  GO TO 70
100 GO TO 60
```

Those without an assembler can use the above program to type in the Hex code.

the *Missile Command* routine, you would type 65023 (Enter), 16FE (Enter), AF (Enter), 32D2FE ... 00FF (Enter). Once that's out of the way, you can break out of the program by deleting one of the quotes and typing STOP.

MISSILE COMMAND EXPLOSION (MCEXP)

Anyone who's ever been in an amusement arcade must surely have come across the *Missile Command* game at some time or other. There the explosions are displayed as circles which get larger and larger and then shrink away to nothing; my first routine is an attempt to simulate this affect. The object code should be entered into memory starting at 65023 (FDFF Hex) and, just as a check, the first address at which no object code should be entered (that is, the

address at which you STOP the Hex loader) should be 65256 (FEEB Hex).

The routine works by drawing a series of octagons on the screen, starting at the co-ordinates stored in XPOS and YPOS (see below). When a 'radius' equal to the contents of LIMIT is reached, the octagons are 'undrawn', but this time in reverse order. This gives an effect very similar to a circle growing and then

```
 10 REM ***********************
 20 REM MCEXP DEMO
 30 REM ***********************
 40 REM
 50 REM ASSIGN VARIABLES
 60 REM
 70 LET XPOS=65236
 80 LET YPOS=65237
 90 LET LIMIT=65238
100 LET SPEED=65239
110 LET DONE=65240
120 REM
130 REM INITIALISE MCEXP
140 REM
150 POKE XPOS,128
160 POKE YPOS,88
170 POKE LIMIT,87
180 POKE SPEED,1
190 REM
200 REM CALL MCEXP
210 REM
220 RANDOMIZE USR 65025
230 REM
240 REM FLASH BORDER UNTIL END
250 REM
260 BORDER RND*7
270 IF PEEK DONE THEN  STOP
280 GO TO 260
```

The Missile Command demo: produces an explosion at the centre of the screen.

shrinking away — without the problems associated with drawing circles (slowness and/or large look-up tables). Note that when the octagons are drawn on the screen, XOR plotting is used. This gives the same effect as using PLOT OVER 1; from Basic.

Once you've typed in the object code it's advisable to save it immediately, just in case you inadvertantly manage to crash the program. Enter SAVE "mcexp" CODE 65023, 233 to save it to tape, and SAVE *"m";1; "mcexp" CODE 65023, 233 to save it to Microdrive cartridge. Then, type in and run the MCEXP DEMO program; if everything is as it should be, an explosion should be produced that starts at the centre of the screen and then fills it.

To use the routine in your own programs, you just have to POKE the locations below with the appropriate values and then use the command RANDOMIZE USR 65025. The variables used in the program are as follows:

XPOS: 65236 (FED4 Hex)
YPOS: 65237 (FED5 Hex)

These should be POKEd with the x and y co-ordinates of the point where the centre of the explosion is required.

LIMIT: 65238 (FED6 Hex)

The radius of the required explosion. Note XPOS — LIMIT 0, XPOS + LIMIT 255, YPOS — LIMIT 0, YPOS + LIMIT 175.

SPEED: 65239 (FED7 Hex)

The speed of the explosion. Note that one is fast, 255 is slow. Total time of explosion = (LIMIT * SPEED + 1)/25

```
FE6D CDADFE          CALL PLOT
FE70 ED5BDDFE        LD   DE,(DE2)
FE74 10EC            DJNZ DIAG
FE76 DD23            INC  IX ;Point to next
FE78 DD23            INC  IX ;entry in DIRTAB
FE7A 0D              DEC  C
FE7B 20C6            JR   NZ,MLOOP
FE7D 3ADFFE   ENDPLT LD   A,(INOUT)
FE80 A7              AND  A
FE81 21DAFE          LD   HL,SIZE
FE84 2010            JR   NZ,IN
FE86 3AD6FE          LD   A,(LIMIT)
FE89 BE              CP   (HL)
FE8A 2803            JR   Z,CHANGE
FE8C 34              INC  (HL) ;Grow
FE8D 1815            JR   RET
              ;Change from growing to shrinking
FE8F 3E01     CHANGE LD   A,1
FE91 32DFFE          LD   (INOUT),A
FE94 180E            JR   RET
FE96 3D       IN     DEC  A
FE97 BE              CP   (HL)
FE98 2009            JR   NZ,INOK
              ;Explosion complete
FE9A 3E01            LD   A,1
FE9C 32D8FE          LD   (DONE),A
FE9F ED56            IM   1
FEA1 1801            JR   RET
FEA3 35       INOK   DEC  (HL) ;Shrink
              ;Restore registers and jump to ROM interrupt routine
FEA4 DDE1     RET    POP  IX
FEA6 F1              POP  AF
FEA7 E1              POP  HL
FEA8 D1              POP  DE
FEA9 C1              POP  BC
FEAA C33800          JP   #38
              ;Invert point if growing, unplot if shrinking
FEAD E5       PLOT   PUSH HL
FEAE F5              PUSH AF
FEAF 3ADFFE          LD   A,(INOUT)
FEB2 A7              AND  A
FEB3 2008            JR   NZ,UNPLOT
              ;Invert point
FEB5 CDC5FE   PLOTX  CALL PIXAD
FEB8 2F              CPL
FEB9 AE              XOR  (HL)
FEBA 77              LD   (HL),A
FEBB 1805            JR   PLTRET
              ;Unplot point
FEBD CDC5FE   UNPLOT CALL PIXAD
FEC0 A6              AND  (HL)
FEC1 77              LD   (HL),A
FEC2 F1       PLTRET POP  AF
FEC3 E1              POP  HL
FEC4 C9              RET
              ;Convert x,y coordinates into d.file address and bit map
FEC5 C5       PIXAD  PUSH BC
FEC6 44              LD   B,H
FEC7 4D              LD   C,L
FEC8 CDAA22          CALL #22AA
FECB 47              LD   B,A
FECC 04              INC  B
FECD 3EFE            LD   A,#FE
FECF 0F       PIXEL  RRCA
FED0 10FD            DJNZ PIXEL
FED2 C1              POP  BC
FED3 C9              RET
              ;Variables
FED4 64       XPOS   DEFB 100 ;X,Y coordinates of centre
FED5 64       YPOS   DEFB 100 ;of explosion on screen
FED6 0A       LIMIT  DEFB 10 ;Max. radius of explosion
FED7 05       SPEED  DEFB 5 ;Speed of explosion
FED8 00       DONE   DEFB 0 ;Flag to indicate end of explosion
FED9 00       COUNT  DEFB 0 ;Interrupts to go before next octagon
FEDA 00       SIZE   DEFB 0 ;Current radius of explosion
FEDB 0000     DE1    DEFW 0 ;Horizontal and vertical
FEDD 0000     DE2    DEFW 0 ;components of diagonal
FEDF 00       INOUT  DEFB 0 ;0, growing; 1, shrinking
              ;Table of directions
FEE0 FFFF     DIRTAB DEFW #FFFF ;Left
FEE2 0001            DEFW #0100 ;Up
FEE4 0100            DEFW #0001 ;Right
FEE6 00FF            DEFW #FF00 ;Down


FCFF                 ORG  #FCFF
FCFF 15FD            DEFW FADE
              ;Initialise variables and interrupts
FD01 AF       GO     XOR  A
FD02 3297FD          LD   (DONE),A
FD05 3C              INC  A
FD06 3298FD          LD   (COUNT),A
FD09 3E08            LD   A,8
FD0B 3299FD          LD   (ROUND),A
FD0E 3EFC            LD   A,#FC ;This makes the Z80 jump to the
FD10 ED47            LD   I,A   ;subroutine whose address is stored
FD12 ED5E            IM   2     ;at FCFF each time an interrupt occurs
```

```
FD14 C9              RET
              ;This code is executed every 0.02 secs
FD15 C5       FADE   PUSH BC
FD16 D5              PUSH DE
FD17 E5              PUSH HL
FD18 F5              PUSH AF
              ;Erase some dots every (SPEED)/50 secs
FD19 2198FD          LD   HL,COUNT
FD1C 35              DEC  (HL)
FD1D 2047            JR   NZ,RET
FD1F 3A96FD          LD   A,(SPEED)
FD22 77              LD   (HL),A
FD23 ED5B92FD        LD   DE,(DPOS)
FD27 ED4B94FD        LD   BC,(DLIM)
FD2B CB21            SLA  C ;Convert number of
FD2D CB21            SLA  C ;rows to number of
FD2F CB21            SLA  C ;hires screen lines
FD31 2199FD          LD   HL,ROUND
FD34 35              DEC  (HL)
FD35 2816            JR   Z,END
              ;Erase some dots in the specified area
FD37 CD6DFD          CALL CHRADR
FD3A 50       MLOOP1 LD   D,B
FD3B 5D              LD   E,L
FD3C ED5F     BYTE1  LD   A,R ;Reasonably random number
FD3E A6              AND  (HL)
FD3F 77              LD   (HL),A
FD40 2C              INC  L
FD41 10F9            DJNZ BYTE1
FD43 42              LD   B,D
FD44 6B              LD   L,E
FD45 CD7CFD          CALL NXTLIN
FD48 0D              DEC  C
FD49 20EF            JR   NZ,MLOOP1
FD4B 1819            JR   RET
              ;Clear the specified area
FD4D CD6DFD   END    CALL CHRADR
FD50 50       MLOOP2 LD   D,B
FD51 5D              LD   E,L
FD52 AF              XOR  A
FD53 77       BYTE2  LD   (HL),A
FD54 2C              INC  L
FD55 10FC            DJNZ BYTE2
FD57 42              LD   B,D
FD58 6B              LD   L,E
FD59 CD7CFD          CALL NXTLIN
FD5C 0D              DEC  C
FD5D 20F1            JR   NZ,MLOOP2
FD5F 3E01            LD   A,1
FD61 3297FD          LD   (DONE),A
FD64 ED56            IM   1
              ;Restore registers and jump to ROM interrupt routine
FD66 F1       RET    POP  AF
FD67 E1              POP  HL
FD68 D1              POP  DE
FD69 C1              POP  BC
FD6A C33800          JP   #38
              ;Convert d,a character position to d. file address
FD6D 7B       CHRADR LD   A,E
FD6E 0F              RRCA
FD6F 0F              RRCA
FD70 0F              RRCA
FD71 E6E0            AND  #E0
FD73 82              ADD  A,D
FD74 6F              LD   L,A
FD75 7B              LD   A,E
FD76 E618            AND  #18
FD78 F640            OR   #40
FD7A 67              LD   H,A
FD7B C9              RET
              ;Find address of next line from address of present one
FD7C 7C       NXTLIN LD   A,H
FD7D 0F              RRCA
FD7E 0F              RRCA
FD7F 0F              RRCA
FD80 C620            ADD  A,32
FD82 3009            JR   NC,DONE2
FD84 67              LD   H,A
FD85 7D              LD   A,L
FD86 C620            ADD  A,32
FD88 6F              LD   L,A
FD89 3001            JR   NC,DONE1
FD8B 24              INC  H
FD8C 7C       DONE1  LD   A,H
FD8D 07       DONE2  RLCA
FD8E 07              RLCA
FD8F 07              RLCA
FD90 67              LD   H,A
FD91 C9              RET
              ;Variables
FD92 00       DPOS   DEFB 0 ;Down and accross position
FD93 00       APOS   DEFB 0 ;of explosion on screen
FD94 05       DLIM   DEFB 5 ;Size of explosion
FD95 20       ALIM   DEFB 32 ;in character squares
FD96 32       SPEED  DEFB 50 ;Speed of explosion
FD97 00       DONE   DEFB 0 ;Flag to indicate end of explosion
FD98 00       COUNT  DEFB 0 ;Interrupts to go before next fade
FD99 00       ROUND  DEFB 0 ;Number of fades to go
```


seconds (approx). Large explosions may take considerably longer.

DONE: 65240 (FED8 Hex)

This location can be PEEKed to determine whether or not the explosion has been completed (since the routine is interrupt-driven, the Basic program continues to run while the machine code is executed). A zero indicates that the explosion is still taking place and a one indicates that it has finished. Note that commands of the form 'IF PEEK DONE . . .' can therefore be used in your programs.

It's advisable to assign the values above to Basic variables at the start of your program. This approach is used in each of the demonstration programs.

DOT FADE EXPLOSION (FADE)

Technically, this isn't really an explosion at all. What happens here is that the object to be 'de-materialised' fades away dot-by-dot. The start address for the object code is 64767 (FCFF Hex), and the first unused address should be 64922 (FD9A Hex). When you've entered the code, save it using SAVE "fade" CODE 64767,155 or SAVE *"m";1;"fade" CODE 64767,155 — for tape or Microdrive respectively.

```
 10 REM ***********************
 20 REM FADE DEMO
 30 REM ***********************
 40 REM
 50 REM ASSIGN VARIABLES
 60 REM
 70 LET DPOS=64914
 80 LET APOS=64915
 90 LET DLIM=64916
100 LET ALIM=64917
110 LET SPEED=64918
120 LET DONE=64919
130 REM
140 REM FILL SCREEN
150 REM
160 FOR I=1 TO 704
170 PRINT CHR$ (RND*95+32);
180 NEXT I
190 REM
200 REM INITIALIZE FADE
210 REM
220 POKE DPOS,0
230 POKE APOS,0
240 POKE DLIM,22
250 POKE ALIM,32
260 POKE SPEED,10
270 REM
280 REM CALL FADE
290 REM
300 RANDOMIZE USR 64769
310 REM
320 REM WAIT UNTIL END
330 REM
340 IF PEEK DONE THEN  STOP
350 GO TO 340
```

The Dot Fade demo: fills an area of the screen with random characters and erases them pixel-by-pixel.

If everything has gone OK so far, then try out the FADE DEMO program. This will (hopefully) fill the screen with random characters and then erase them pixel-by-pixel. To use the routine from



TO THE STARS!

FOR THE 48K SPECTRUM FROM GARGOYLE GAMES

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BANG GOES YOUR CODE

your own programs, just POKE the locations shown below with the appropriate vaues and then use the command RANDOMIZE USR 64769. The variables used are:

DPOS: 64914 (FD92 Hex)
APOS: 64915 (FD93 Hex)

These should be POKEd with the down and across co-ordinates of the top left character square in the area to be exploded. Note that this is a different approach to the one used in MCEXP which uses x,y co-ordinates (this is, pixel co-ordinates).

DLIM: 64916 (FD94 Hex)
ALIM: 64917 (FD95 Hex)

These should be POKEd with the size of the area in character squares, down and across respectively.

SPEED: 64918 (FD96 Hex)

The speed of the explosion. Again, one is fast, 255 is slow. Total time of explosion = SPEED/3 seconds (approx). Large areas may take considerably longer.

DONE: 64919 (FD97 Hex)

The same as for MCEXP.

```
FBFF                   ORG  #FBFF
FBFF 15FC              DEFW FLASH
              ;Initialise variables and interrupts
FC01 AF       GO       XOR  A
FC02 32C7FC            LD   (DONE),A
FC05 3C                INC  A
FC06 32C8FC            LD   (COUNT),A
FC09 3E08              LD   A,8
FC0B 32C9FC            LD   (ROUND),A
FC0E 3EFB              LD   A,#FB ;This makes the Z80 jump to the
FC10 ED47              LD   I,A   ;subroutine whose address is stored
FC12 ED5E              IM   2     ;at FBFF each time an interrupt occurs
FC14 C9                RET
              ;This code is executed every 0.02 secs
FC15 C5       FLASH    PUSH BC
FC16 D5                PUSH DE
FC17 E5                PUSH HL
FC18 F5                PUSH AF
              ;Flash every (SPEED)/50 secs
FC19 21C8FC            LD   HL,COUNT
FC1C 35                DEC  (HL)
FC1D 2077              JR   NZ,RET
FC1F 3AC6FC            LD   A,(SPEED)
FC22 77                LD   (HL),A
FC23 ED5BC2FC          LD   DE,(DPOS)
FC27 ED4BC4FC          LD   BC,(DLIM)
FC2B CB21              SLA  C ;Convert number of
FC2D CB21              SLA  C ;rows to number of
FC2F CB21              SLA  C ;hires screen lines
FC31 21C9FC            LD   HL,ROUND
FC34 35                DEC  (HL)
FC35 2846              JR   Z,END
              ;Flash specified area
FC37 CD9DFC            CALL CHRADR
FC3A 50       MLOOP1   LD   D,B
FC3B 5D                LD   E,L
FC3C ED5F     BYTE1    LD   A,R
FC3E 77                LD   (HL),A
FC3F ED5F              LD   A,R ;Reasonably random number
FC41 0F                RRCA
FC42 0F                RRCA
FC43 AE                XOR  (HL)
FC44 77                LD   (HL),A
FC45 2C                INC  L
FC46 10F4              DJNZ BYTE1
FC48 42                LD   B,D
```

COLOUR FLASH EXPLOSION (FLASH)

In this explosion, various different patterns of random dots flash up onto the screen in many colours and then disappear. The routine itself is very similar to the FADE routine, and using it is exactly the same except that the numbers are different. Therefore I'll just give you the numbers, as it were, and you can use the text from FADE as a guide where necessary. But, there is one other important difference — the demonstration program is called FLASH DEMO and it fills the screen with random characters and then explodes them appropriately. Here are the various numbers:

```
 10 REM ***********************
 20 REM FLASH DEMO
 30 REM ***********************
 40 REM
 50 REM ASSIGN VARIABLES
 60 REM
 70 LET DPOS=64706
 80 LET APOS=64707
 90 LET DLIM=64708
100 LET ALIM=64709
110 LET SPEED=64710
120 LET DONE=64711
130 REM
140 REM FILL SCREEN
150 REM
160 FOR I=1 TO 704
170 PRINT CHR$ (RND*95+32);
180 NEXT I
190 REM
200 REM INITIALIZE FLASH
210 REM
220 POKE DPOS,0
230 POKE APOS,0
240 POKE DLIM,22
250 POKE ALIM,32
260 POKE SPEED,5
270 REM
280 REM CALL FLASH
290 REM
300 RANDOMIZE USR 64513
310 REM
320 REM WAIT UNTIL END
330 REM
340 IF PEEK DONE THEN  STOP
350 GO TO 340
```

The Colour Flash demo: flashes a number of random characters in different colours and then erases them.

Start address: 64511 (FBFF Hex)
First unused address: 64714 (FCCA Hex)
Saving: SAVE "flash" CODE 64511,203 or SAVE *"m";1;"flash" CODE 64511,203 (for tape or Microdrive respectively).
To use from Basic: RANDOMIZE USR 64513
Variables:

- **DPOS: 64706 (FCC2 Hex)**
- **APOS: 64707 (FCC3 Hex)**
- **DLIM: 64708 (FCC4 Hex)**
- **ALIM: 64709 (FCC5 Hex)**
- **SPEED: 64710 (FCC6 Hex)**
- **DONE: 64711 (FCC7 Hex)**

Note that each of the routines occupies a different area of memory (they don't overlap). It's therefore possible to have all three routines in memory at the same time — although you'll only ever have one explosion occuring on the screen at any one time. Also, the use of BEEP, LOAD or SAVE while an interrupt is occuring will temporarily halt it. Happy zapping! YS

```
FC49 6B              LD   L,E
FC4A CDACFC          CALL NXTLIN
FC4D 0D              DEC  C
FC4E 20FA            JR   NZ,MLOOP1
FC50 2AC2FC          LD   HL,(DPOS)
              ;Convert d,a position to address in attribute file
FC53 7C              LD   A,H
FC54 2600            LD   H,0
FC56 0605            LD   B,5
FC58 29       DOUBLE ADD  HL,HL
FC59 10FD            DJNZ DOUBLE
FC5B B5              OR   L
FC5C 6F              LD   L,A
FC5D 7C              LD   A,H
FC5E F658            OR   #58
FC60 67              LD   H,A
              ;Colour in specified area with (ROUND) ink
FC61 ED4BC4FC        LD   BC,(DLIM)
FC65 3AC9FC          LD   A,(ROUND)
FC68 57              LD   D,A
FC69 5D       ALINE  LD   E,L
FC6A C5              PUSH BC
FC6B 7E       ABYTE  LD   A,(HL)
FC6C E6F8            AND  #F8
FC6E B2              OR   D
FC6F 77              LD   (HL),A
FC70 2C              INC  L
FC71 10F8            DJNZ ABYTE
FC73 6B              LD   L,E
FC74 0E20            LD   C,32
FC76 09              ADD  HL,BC
FC77 C1              POP  BC
FC78 0D              DEC  C
FC79 20EE            JR   NZ,ALINE
FC7B 1819            JR   RET
              ;Clear specified area
FC7D CD9DFC   END    CALL CHRADR
FC80 50       MLOOP2 LD   D,B
FC81 5D              LD   E,L
FC82 AF              XOR  A
FC83 77       BYTE2  LD   (HL),A
FC84 2C              INC  L
FC85 10FC            DJNZ BYTE2
FC87 42              LD   B,D
FC88 6B              LD   L,E
FC89 CDACFC          CALL NXTLIN
FC8C 0D              DEC  C
FC8D 20F1            JR   NZ,MLOOP2
FC8F 3E01            LD   A,1
FC91 32C7FC          LD   (DONE),A
FC94 ED56            IM   1
              ;Restore registers and jump to ROM interrupt routine
FC96 F1       RET    POP  AF
FC97 E1              POP  HL
FC98 D1              POP  DE
FC99 C1              POP  BC
FC9A C33800          JP   #38
              ;Convert d,a character position to d. file address
FC9D 7B       CHRADR LD   A,E
FC9E 0F              RRCA
FC9F 0F              RRCA
FCA0 0F              RRCA
FCA1 E6E0            AND  #E0
FCA3 82              ADD  A,D
FCA4 6F              LD   L,A
FCA5 7B              LD   A,E
FCA6 E618            AND  #18
FCA8 F640            OR   #40
FCAA 67              LD   H,A
FCAB C9              RET
              ;Find address of next line from address of present one
FCAC 7C       NXTLIN LD   A,H
FCAD 0F              RRCA
FCAE 0F              RRCA
FCAF 0F              RRCA
FCB0 C620            ADD  A,32
FCB2 3009            JR   NC,DONE2
FCB4 67              LD   H,A
FCB5 7D              LD   A,L
FCB6 C620            ADD  A,32
FCB8 6F              LD   L,A
FCB9 3001            JR   NC,DONE1
FCBB 24              INC  H
FCBC 7C       DONE1  LD   A,H
FCBD 07       DONE2  RLCA
FCBE 07              RLCA
FCBF 07              RLCA
FCC0 67              LD   H,A
FCC1 C9              RET
              ;Variables
FCC2 00       DPOS   DEFB 0 ;Down and accross position
FCC3 00       APOS   DEFB 0 ;of explosion on screen
FCC4 05       DLIM   DEFB 5 ;Size of explosion
FCC5 20       ALIM   DEFB 32 ;in character squares
FCC6 32       SPEED  DEFB 50 ;Speed of explosion
FCC7 00       DONE   DEFB 0 ;Flag to indicate end of explosion
FCC8 00       COUNT  DEFB 0 ;Interrupts to go before next fade
FCC9 00       ROUND  DEFB 0 ;Number of fades to go
```

DIY CENTRONICS INTERFACE

FACING UP TO PRINTERS

Logic and software designer* John Flenley *subscribes to the philosophy that if you can't afford to buy a custom-built unit, you should try and solder-it-yourself. In the first half of his two-part feature,* John *takes you through the hardware involved in a Centronics interface.

You've spent money on a new micro ... grown tired of the games ... and moved on to dabble with a bit of programming; now you probably feel you could do with a printer to help you with your listings and so on. Well, for Sinclair Research micros there is, of course, the ZX Printer, but for owners fed-up with papering the house with four-inch wide scraps of silver paper, then a larger printer will probably form the butt of their next argument with the Bank Manager.

However, the story doesn't end there. If you want to make your computer 'talk' to it successfully, of course you'll be needing an interface of some kind — one that converts the output signals from the computer into a form that the printer will understand. The most common vision to be found in printers today is the parallel, or Centronics, interface. Some printers have serial, or RS232, interfaces but these normally only appear on the more expensive models. Naturally, there are Centronics interfaces on the market for the Spectrum, but for the budding computer DIY fan, with soldering iron and a bit of spare time to play around with, the circuit is not one that'll cause too much of a problem.

Not tried DIY before? All sounds a bit complicated? Well, despite the mystique that still surrounds logic design, the truth is that with modern chips, it's all rather like a sophisticated form of building with LEGO bricks. As long as you conform to a standard set of electrical rules, then most circuits are simple to construct — you just 'bolt' the chips together. So, soldering irons at the ready? Let's go!

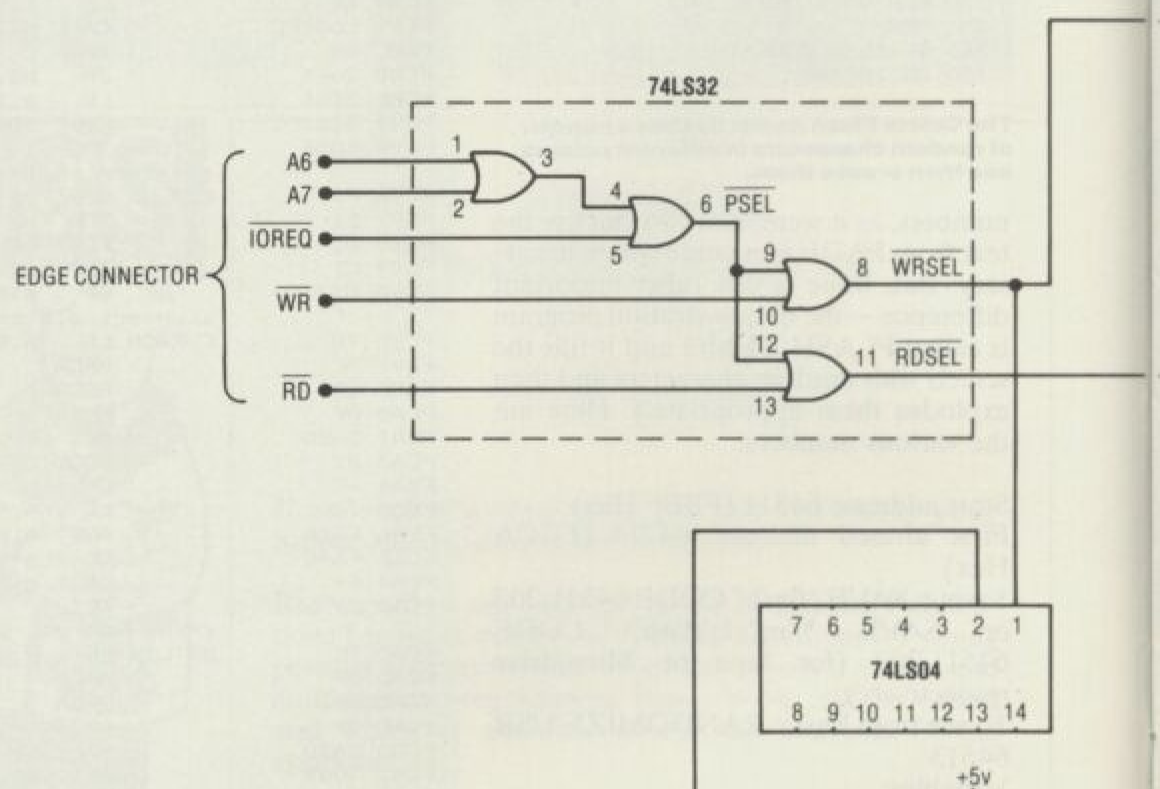
MODUS OPERANDI

The first problem to tackle, when designing a piece of hardware that your computer is supposed to talk to, is to understand how you let the device know *when* it's being connected. To explain this, let's look at how the Z80 CPU, the heart of the Spectrum, operates in relation to external devices. The Z80 has internal registers that it can manipulate without any reference to the outside world, but if it's to do anything meaningful, then clearly it has to get instructions from somewhere — and this involves communicating with external circuitry.

That can be ROM chips, such as the one in the Spectrum containing the Basic interpreter, or RAM chips, that may contain programs or data of your own. It communicates with these devices by putting the 'address' of the information that it wants on to the 'address bus', and pulling a special signal line, Memory REQuest (MREQ), to logical low position. When a memory chip sees one of its addresses on the address bus and MREQ low, then it knows that the Z80 wants something — so it outputs the required data onto the DATA bus.

We don't really want to give our interface a memory address, however, because all available memory areas are already in use on the larger Spectrum. Luckily, the Z80 has another signal line. IOREQ, that can also be used when talking with outside devices. When using the IN or OUT commands, the address of the device is again put on to the address bus, but instead of MREQ being pulled low by the Z80, IOREQ is instead. This means then that we have a possible 65535 (64K) I/O (Input/Output) 'ports' and in theory this is the number of different devices that the Z80 could handle in addition to its 64K memory.

THE CENTRONICS INTERFACE CIRCUIT BOARD



This diagram illustrates how the Centronics interface hardware should be pieced together. Although the actual location of the chips would be suitable, it is important to note that the numbers represent which leg the connection should be made to, and *not* the actual position of the connection. The DECODE part of the circuit (74LS32) has been explored to make it easier for you to see what's going on.

I say 'in theory', because Sinclair Research has left our choice of addresses rather limited. Instead of decoding a device address by its full 16 bits, Sinclair Research uses only one address line to decode each of the devices in the Spectrum (printer, keyboard [which uses all eight high order lines, A8-A15], border, loudspeaker, etc). For example, the ZX Printer is given address 251 (FB) (11111011 binary — which would appear on the address bus).

But the only line that the printer is interested in is A2, which you can see is the only line left low. Therefore, when A2 is low, the printer always assumes that you are talking to it, so whatever address we choose for our device, A2 cannot be low. Once all the other (internal) devices and Interface 1 unit are taken into account, we're left with only A5, A6 and A7 that can be low. As I said before, our choice of addresses is rather limited.

OK, say we have A6 and A7 low and the rest high — that is 11011111 or DF in Hex, 223 decimal. This then will be the address of our device — but how do we decode 223 on the address bus? What we need is a circuit that will give us a signal that is low when A6 and A7 and IOREQ are low. Well, remember OR gates? An OR gate is a device that gives a high output when any of its inputs are high. Conversely, it will only give a low output when all of its inputs are low. So, if we use a dual-input OR gate, put A6 into one input, A7 into the other, then the output of this gate will be low when both A6 and A7 are low. Use this output as an input for another OR gate, put IOREQ into the other input and we have the first part of our circuit. The output of the second OR gate will be low when all our requisite signals are low, yes? Good, so what do we use this new signal for? let's label it first, PSEL, standing for Port SELect.

GOING IN

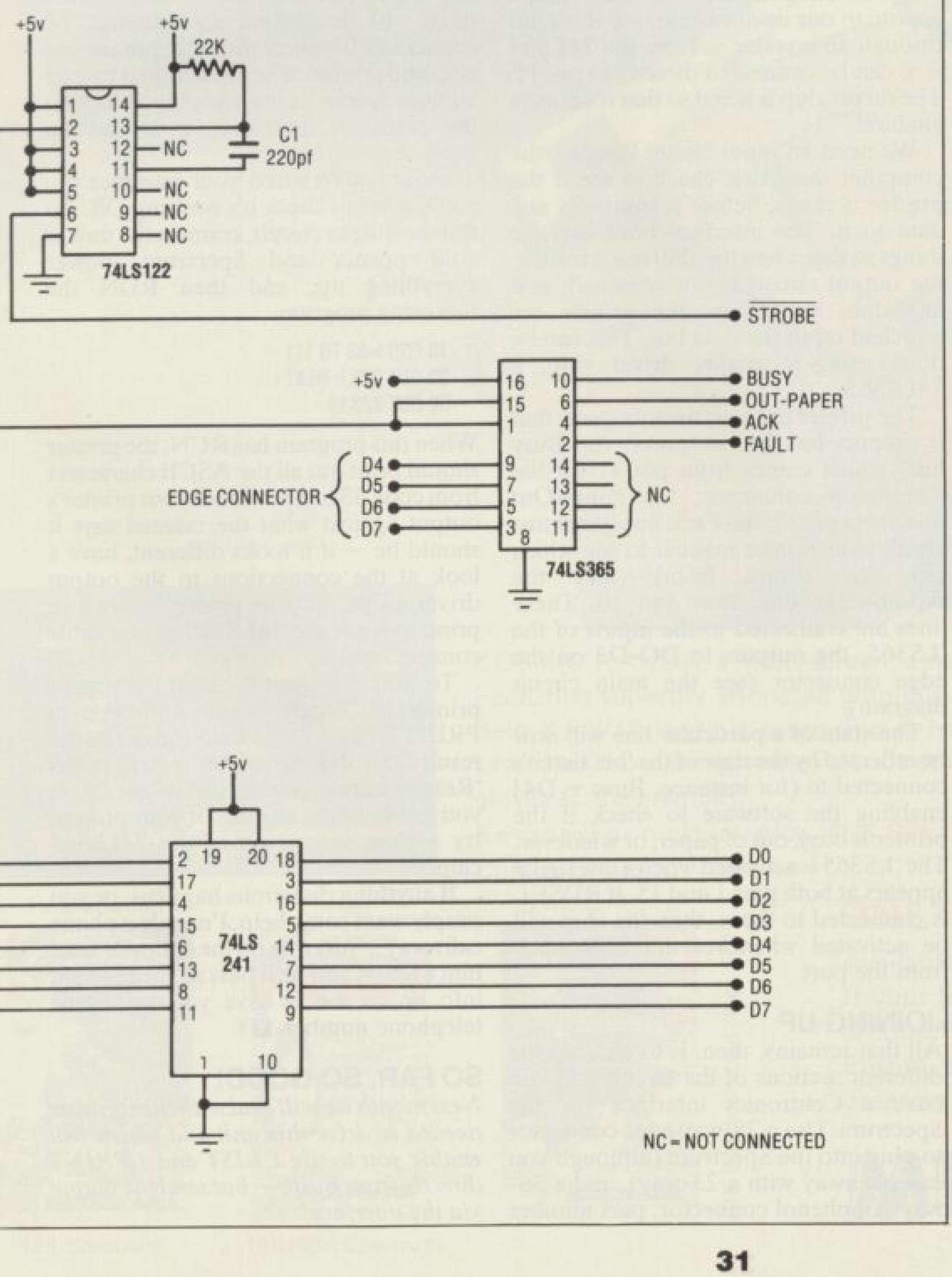
There are two distinct parts of the Centronics circuit, one that handles the output of data (computer to printer) and the other to handle the input (printer to computer). However clever you might think your Spectrum is, it cannot handle more than one thing at a time so, at any one point, only one of these circuits can be active — otherwise they'll interfere with each other.

We must therefore use PSEL to generate two other signals, to activate the separate input and output circuits when they are needed. Again, we can use dual-input OR gates. Put PSEL into one input and into the other, the WR signal from the edge connector. WR is pulled low by the Z80 when it puts data on to the data bus (WRiting) so the output of this gate will be low when the Z80 is sending data to our device. Label this signal WRSEL.

Similarly, into yet another OR gate, put PSEL and the RD signal. RD is low when the Z80 is ReaDing from the data bus, so the output of the gate will be low when it's reading from our port. Label this signal RDSEL. We should now have the DECODE part of the circuit constructed in line with the illustration given, and this will handle both the decoding of the port address and the selecting of input or output circuits. This part can be made up from a single chip, a 74LS32, the pin layout of which is also shown.

COMING OUT

Now the output circuit. The Centronics interface is a parallel interface, meaning that it delivers all eight bits of data to the printer at once, on eight separate data lines. To let the printer know when valid data is on these lines, there's another signal line, called the Strobe line. This is



36 WAY AMPHENOL CONNECTOR CONNECTIONS

PIN NUMBER	SIGNAL
1	STROBE
2	D0
3	D1
4	D2
5	D3
6	D4
7	D5
8	D6
9	D7
10	ACK
11	BUSY
12	PAPER-OUT*
13	NC
14	NC
15	NC
16	GND
17	GND
18	NC
19	GND
20	GND
21	GND
22	GND
23	GND
23	GND
24	GND
25	GND
26	GND
27	GND
28	GND
29	GND
30	GND
31	NC
32	FAULT
33	GND
34	NC
35	NC
36	NC

***Check printer manual for location of this signal**

FACING UP TO PRINTERS

normally high, but is pulled low for between one and 100 microseconds when data is output. We can create this signal using one chip, a 74LS122 (technically known as a re-triggerable monostable multivibrator) which outputs a pulse depending on certain inputs to it; the duration of this pulse can be set by using a combination of resistor and capacitor attached to two of its pins.

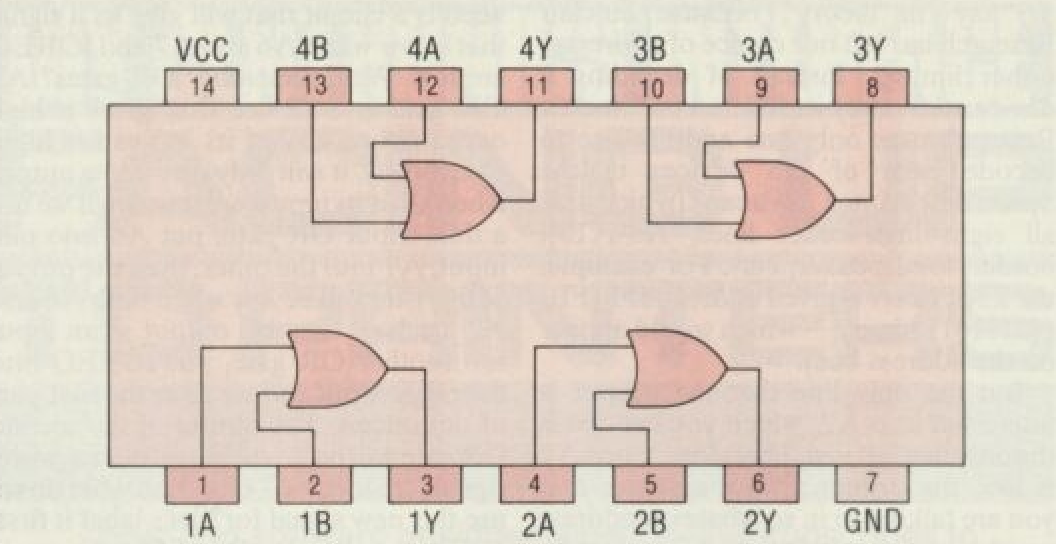
The chip also has two output pins, one giving a high pulse and the other a low; the choice of which you use is up to you. By using the WRSEL signal we can easily produce a low pulse output to use as the Strobe signal. The connections to be made are illustrated in the main circuit diagram. Using this configuration, a low pulse will be output from pin six whenever the signal at pin two (WRSEL) goes from high to low. The choice of 22K ohm resistor and 220pf capacitor gives a pulse of about two microseconds, which is ample time for even the slowest of printers.

The other part of the output circuit deals with the actual data transmission. When the Z80 puts data on to the data bus, it only remains valid for a very short time; therefore, we really need to trap a copy of it somewhere so we can deal with it at our leisure. We do this with a chip called a latch (74LS273 — actually called an octal D-type flip-flop), which does exactly as the name suggests — that is it 'latches' the data. We can then use an eight-bit driver chip to take the individual 'bits' of data from the latch and transmit them down their individual lines to the printer. We must use a driver because normal TTL chips don't have the power to send signals down long lengths of cable. The 74LS241 chosen will happily send signals down cables up to two metres in length.

YOU WILL NEED

1 × 74LS32
1 × 74LS04
1 × 74LS122
1 × 74LS365
1 × 74LS241
1 × 74LS273
1 × 22K resistor
1 × 22pF ceramic capacitor
1 × 23- or 28-way edge connector
1 × 36-way Amphenol connector
6 × 10nF ceramic decoupling capacitors (optional)

All these parts are available from places such at Watford Electronics, Cricklewood Electronics or Maplins.



The DECODE part of the circuit comprises a single chip — the 74LS32 — which will handle the decoding of the port address as well as the selection of input or output circuits.

The details of this part of the circuit are also provided in the main circuit illustration. The latch is wired so that it operates whenever the signal at pin 11 goes from low to high. We already know that WRSEL goes from high to low when a write to our device occurs, so if it's put through an inverter — here, the 74LS04 — it can be connected directly to pin 11. The driver chip is wired so that it's always enabled.

We need an input circuit because the computer must first check to see if the printer is ready, before it transmits any data to it. The interface must arrange things so that when the Z80 reads from it, the output circuit is not activated, and any data lines from the printer are switched on to the data bus. This can be done using a smaller driver chip, a 74LS365.

The printer has four useful signals that it outputs for the computer: the Busy line, which comes from pin 11 on the Centronics connector; the Paper-Out line, from pin 12; the Fault line (you must check your printer manual to see which pin this comes from); and the Acknowlege line, from pin 10. These lines are connected to the inputs of the 'LS365, the outputs to DO-D3 on the edge connector (see the main circuit diagram).

The state of a particular line will now be reflected by the state of the 'bit' that it's connected to (for instance, Busy = D4) enabling the software to check if the printer is busy, out of paper, or whatever. The 'LS365 is activated when a low signal appears at both pins 1 and 15. If RDSEL is connected to these, then the chip will be activated whenever the Z80 reads from the port.

JOINING UP

All that remains, then, is to wire up the different sections of the circuit and you have a Centronics interface for the Spectrum. Use a 28-way edge connector to plug into the Spectrum (although you can get away with a 23-way), and a 36-way Amphenol connector, part number 57F-3036020 to plug into the printer. Details of both these connectors are provided in illustrative form. Always use 74LS series TTL as they draw very little power from the Spectrum (which is under strain as it is). One further point, use de-coupling capacitors to filter the power supplies to each chip. These can be any value ceramic capacitors, in the range 10 to 100nf and should be connected between the +5v pin on the chip and ground. Their function is to stop voltage spikes doing naughty things to the chips — therefore, a worthwhile exercise.

Once you've wired your interface up, you'll want to check it's working OK. To test the output circuit, connect the unit to your printer and Spectrum, power everything up, and then RUN the following program:

```
10 FOR i=33 TO 111
20 OUT 223,i: NEXT i
30 OUT 223,13
```

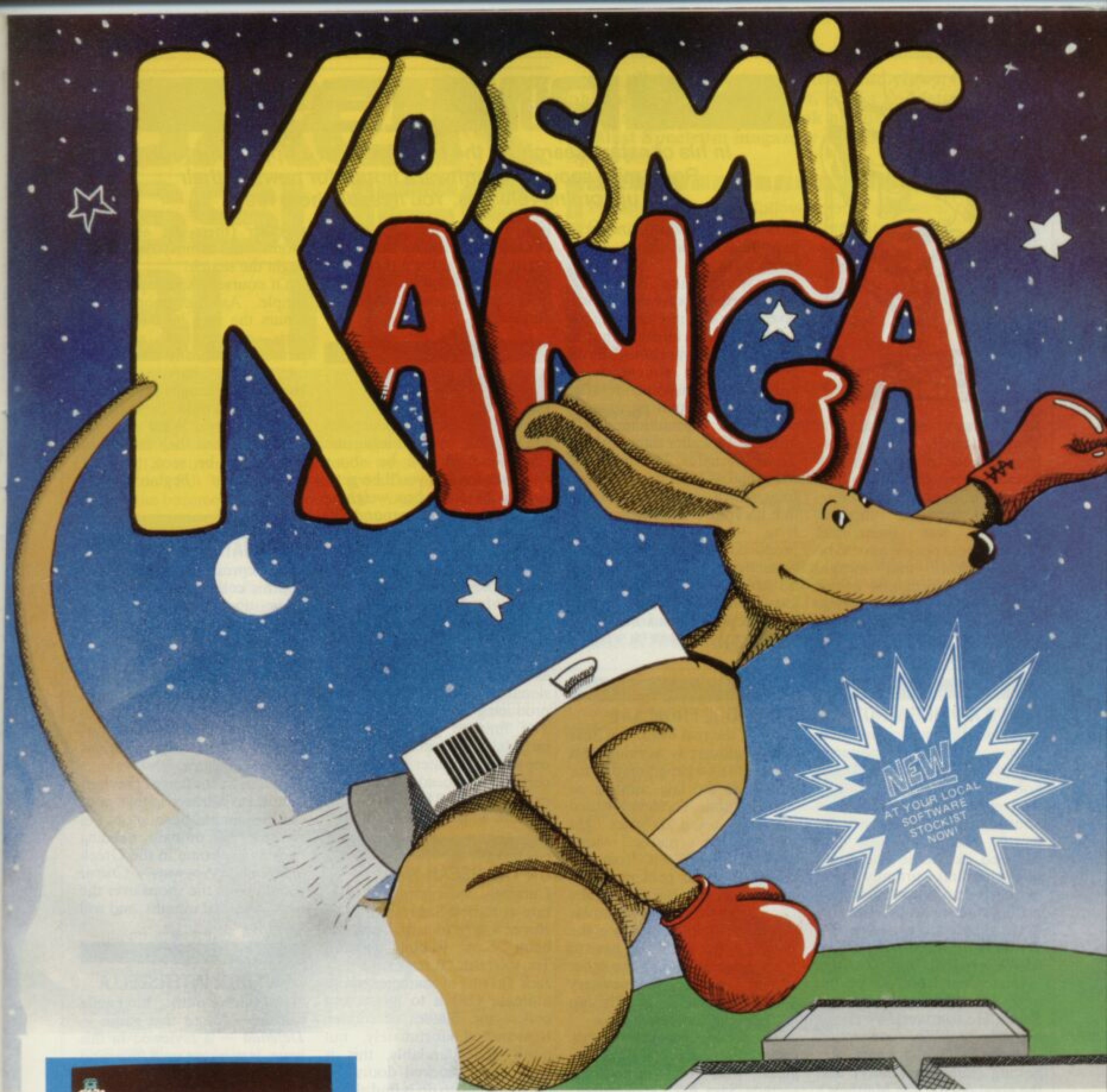
When this program has RUN, the printer should print out all the ASCII characters from code 33 to 111. Check your printer's output against what the manual says it should be — if it looks different, have a look at the connections to the output driver chips. If your printer refuses to print, suspect the 74LS122 or the cable connections.

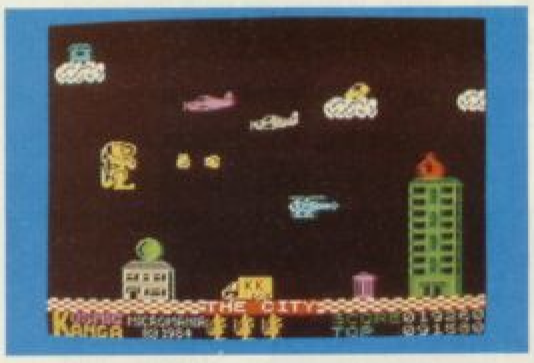
To test the input circuit, get your printer in 'Ready' status and type in PRINT IN 223 — this should give you the result 207; if your printer wasn't in the 'Ready' status, you should've got 95. If you got anything else out of your printer, try a close inspection of the 74LS365 chip.

If anything disastrous happens, or you simply want some help, I'm only a phone call away — just ring up the editor or send him a letter, and he'll pass all the relevant info on to me or give you my home telephone number. YS

SO FAR, SO GOOD!

Next month we will deal with the software needed to drive this unit and which will enable you to use LLIST and LPRINT directly from Basic — but send the output via the interface!





KOSMIC KANGA, a multi-screen, amazing, arcade standard original action game. Featuring superbly animated graphics and packed full of arcade features. Help KANGA find his space ship so he can return home to his planet. Leap about buildings, trees, clouds etc., pick up bonuses and throw boxing gloves at the enemies.

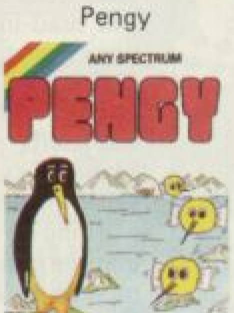
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RUMBLES

In his constant search for the truth (or even a ripping rumour) Ron Smith scours the software houes for news of their upcoming releases. You'll read it here first!



Not long ago, amidst the usual frenzied activity of the *YS* offices, a phone call came through from someone claiming to be a PR man from one of the better-known software houses. Suspicion was immediate! Usually, these people have to be tracked down and meagre morsels of information prized from the protected storage systems they have for minds with the skill of a practised psychoanalyst.

WHO'S KIDDING WHO?

However, this particularly nervous specimen (who announced himself as Philip Thompson of Software Projects) could hardly stop gibbering away; over an hour-long conversation, he gave us the 'low-down' on what sounded like some interesting new programs currently being written — and also some surprising stuff on *Jet Set Willy.*

He mentioned two games — *Jet Set Willy Meets The Taxman* and *Miner Willy And Dr Jones* — and alleged both to be the new brainchildren of Matthew Smith. He continued by claiming a real-life connection between Smith and Jones, suggesting (rather unkindly) that the good doctor was Matthew's psychiatrist. And for anyone who's spent hours trying to collect all the objects in *Jet Set Willy,* Thompson offered the advice, "It's only necessary to pick up half of them to win".

But here's the rub. When we tried to telephone Mr Thompson to verify some of his comments, a confused receptionist from Software Projects declared, "I don't think we've got anyone of that name here". After a few minutes' double checking, she came back with denials from Alan Maton, Chris Lyle and Colin Stokes — all of whom ought to know! In fact, a chat with Chris not only confirmed Thompson's non-existence, but also that there was no substance to any of his 'inside' information. However, it was confirmed that Matthew is working on a third, and perhaps final, game in the *Willy* series.

But who is Philip Thompson? Well, further excavation work revealed some interesting new information. It appears that a number of software houses have been receiving strange telephone calls from someone who assumes a different persona in each case; sometimes, for instance, the caller claims to be a *Times* journalist. The only lead we've had so far is from a rather Imaginative source who reckons that it's John Philips from Bug-Byte — the company that produced Matthew's original bestseller, *Manic Miner,* before he moved on to Software Projects. John came up with a pretty earthy reply to these accusations . . . the gist of it was "it weren't me, guv!".

TWO MORE FROM A&F

Back in the real world, we hear A&F Software is working on a couple of new programs due for release in the late summer or early autumn. The first is called *Cylon Attack,* a 3D space fight where the player views approaching targets from the window of the cockpit; these increase in size the closer they come. There's also a radar screen to help you locate the enemy — but you'll also have to keep a careful eye on the other guages, because it's necessary now and then to quickly nip back to the mothership.

The second program sounds even better, according to the great wall of surrounding secrecy. Says A&F spokesman, Martin Hinkling, "It's a brilliant idea, and we've already got a lot of the graphics done. But I can't say any more at the moment for fear of our competitors". More information is promised around August.

IMAGINE TAKES THE PLUNGE

It now looks like the retail price of Imagine's new megagame (*Bandasnatch*) will be about £40. But for this you'll be getting an A4-sized box weighing 2-3lbs containing around 30 goodies, including a customized piece of hardware that will allow the accompanying software to provide 20-30 times the playing power of a normal game.

Says Imagine's Bruce Everiss, "We've got ten professional artists working on the graphics, as well as a couple of professional writers who are producing the documentation. The finished product, which includes 11 entirely new concepts in computer games, will certainly exceed everyone's expectations." The launch date remains sometime in August.

ON THE OCEAN WAVE

Currently undergoing manufacture at Rabbit Software is *Jolly Roger,* a saga of salty life at the helm. Says Rabbit director, Terry Grant, "It features a jolly Jack Tar sort of character whose ultimate goal is to locate and collect the masses of hidden treasure." Unfortunately, but quite understandably, this is kept behind locked doors. So the first thing to do is find all the keys; having got a bunch together (there are about 50 rooms, or cabins) you then begin the search.

Of course, it's not quite *that* simple. As the poor fellow scours the ship he encounters such horrors as energetic pirates, parrots and rats (not to mention a character called Heather and a rugby team — but then, that could be part of another story). What they do with him when they catch him remains to be seen, possibly around the beginning of August.

AUTOMATA CASTAWAY

The irrepressible Mel Croucher and his colleagues from Automata are staying very tight-lipped over something they're calling *Crusoe.* All they'll say at the moment is that it's an extremely funny adventure, and a bit better than *Valhalla.* Presumably, too, it's safe to assume some sort of connection with the famous shipwreck victim.

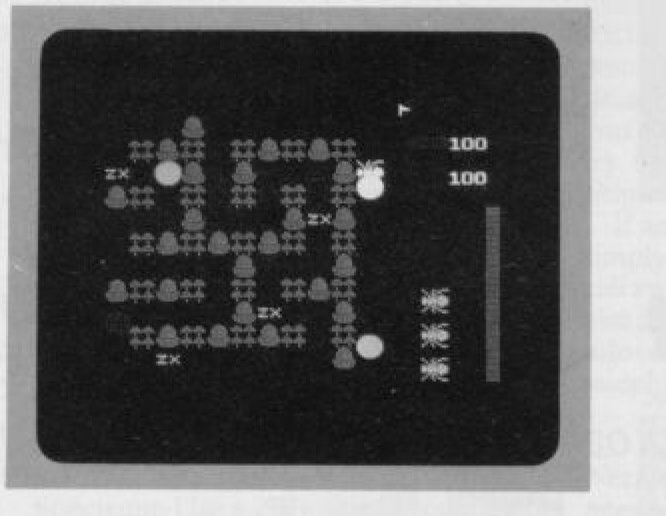
Bad news for fans of previous Automata releases is that poor old Pi-man has been left out in the cold; he's probably heading back to his home in the Greek alphabet. Anyway, *Crusoe* should be in the shops over the next couple of months, and will retail for £6.

NEW FROM INTERSTELLA

New games outfit, Interstella Software, whose first game — *Defenda* — is reviewed in this issue, is working on a 'question and answer' series entitled *A Question Of* . . . something; sport will probably form the first 'something' (as if you hadn't guessed!). It'll feature an egg timer that shows how much time you've got left as well as a thermometer for taking your temperature.

Selling at £5.50, the program is being written by one of the directors, Peter Stevens, and will read-in up to 2,000 questions from tape, in four blocks of 500.

The other half of the Interstella partnership is Alan Lloyd. He's the one responsible for *Defenda* and is at present working on a *Junior Cong* game that we're assured will be more professional than his first effort; his partner says, "He's got better since then." This should be available over the next few weeks, price £5.50. YS



New from the Silversoft stable comes *Hyperaction*, an eight level game in which you battle 'Pacmen' lookalikes and hungry jellyfish. Watch out for this sometime in August...

BACK ISSUES BLITZ

Calling all Spectrum owners . . . if you've missed out at the newsagents, don't fret 'cause we've still got a few issues left over. Deep in the basement of Rathbone Place, our lovable layabout Distribution man, Trevor, stubbed his toe on some misplaced packages full of . . . would you believe it . . . back issues of *Your Spectrum*.

Well, we wouldn't want to get the poor guy in trouble for not selling them, so we're offering you the chance to help out. Check out the coupon at the bottom of the page and send it off quickly — there's not that many left, and we'd hate you not to complete your collection.

For all this and more — news and views, fun and philosophy, charts and chat, books and letters, rumours and reviews — look no further than the greatest Spectrum magazine around — *Your Spectrum*.

Please send me the following back issues of Your Spectrum (£1.10 each, includes handling).

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ISSUE 1

Funny looking programmer — no, you don't have to look like this to enjoy the magazine!



Build a keyboard buffer for the Speccy under the expert guidance of **Stephen Adams**.

Grandmaster **Dr John Nunn** presides over five chess packages all challenging one another. Check it out!

Acknowledged expert on machine code, **Toni Baker**, came up with the impossible — a way to break out of machine code loops.

Have you considered that there could be anything faster than Basic. We did . . . and so should you.

ISSUE 2

Rather a cute cover — which suggests nothing of the great software reviews, machine code machinations, and hardware bits and bobs within. Ah, well.



The issue is resplendent with a giant poster-map giving the complete layout to Quicksilva's mighty **Ant Attack**, as well as an insight into Sandy White's programming ventures.

The QL is announced, and we send our spies into the hallowed halls of Psion to get the inside story. Full details on the mysterious micro inside.

If you've got software worth protecting, then get all the inside info from **Simon Goodwin**. You know it makes sense. . .

ISSUE 3

Add a little zip to your programming prowess — a tutorial on how to write good software. And just to prove it can be done, start organising your own compiler.



The QL gains momentum (well, nearly) and **Andrew Pennell** takes a good look at SuperBasic and compares it to the ZX Basic we all know and love.

Durell Software release **Scuba Dive** for the Speccy, but wouldn't you just love to see the whole thing? Come on in, the water's lovely.

A Spectrum — but what issue is it? Learn how to look for the tell-tale signs as **Stephen Adams** inspects the guts of the machine.

ISSUE 4

Fed up with the quality of the ZX Printer? There's a lot going for upgrading, as you can see by the subtle colour simulations you can achieve — and all it needs is a little bit of code. S'amazing really!



For the best screen shots of all your favourite games, look no further than **YS**'s review pages. (So what if our ace photographer told me to write that — it's true!)

Along with a detailed review of **Jet Set Willy**, **Andrew Pennell** decides to see just how the game ticks. Follow the trials and tribulations of a closet hacker as he makes his way through the fully illustrated plan of Matthew Smith's wonderworld.

At long last **Quentin Lowe** gets a close look at a QL. Find out all the gory details of the hardware, software and. . . the dreaded 'kludge'.

CRY OF THE WULF

Those howls aren't coming from the night — it's* Ross Holman *(winner of Software Projects'* JSW *competition) pitting his animal wits against Ultimate's mighty* Sabre Wulf. *Read on ... we dare you!

Thrust deep into a steamy tropical jungle, your trusty sword and your wits are the only defence against the myriad creatures lurking in the foliage. Yes, you are the pith-helmeted explorer who has to collect four parts of an amulet that have been carelessly left around the jungle — and then get out safely.

By now, many should be familiar with the scenario of Ultimate's latest 48K adventure *Sabre Wulf* — perhaps they've even had enough time to recover from the £10 price tag. For the extra cash you get a large *Hobbit*-like box which holds one tape and an enlarged glossy version of the cassette sleeve — containing the usual silly storyline, loading instructions and control key info.



ILLUSTRATION BY ERICA SMITH & EDWARD DUNN

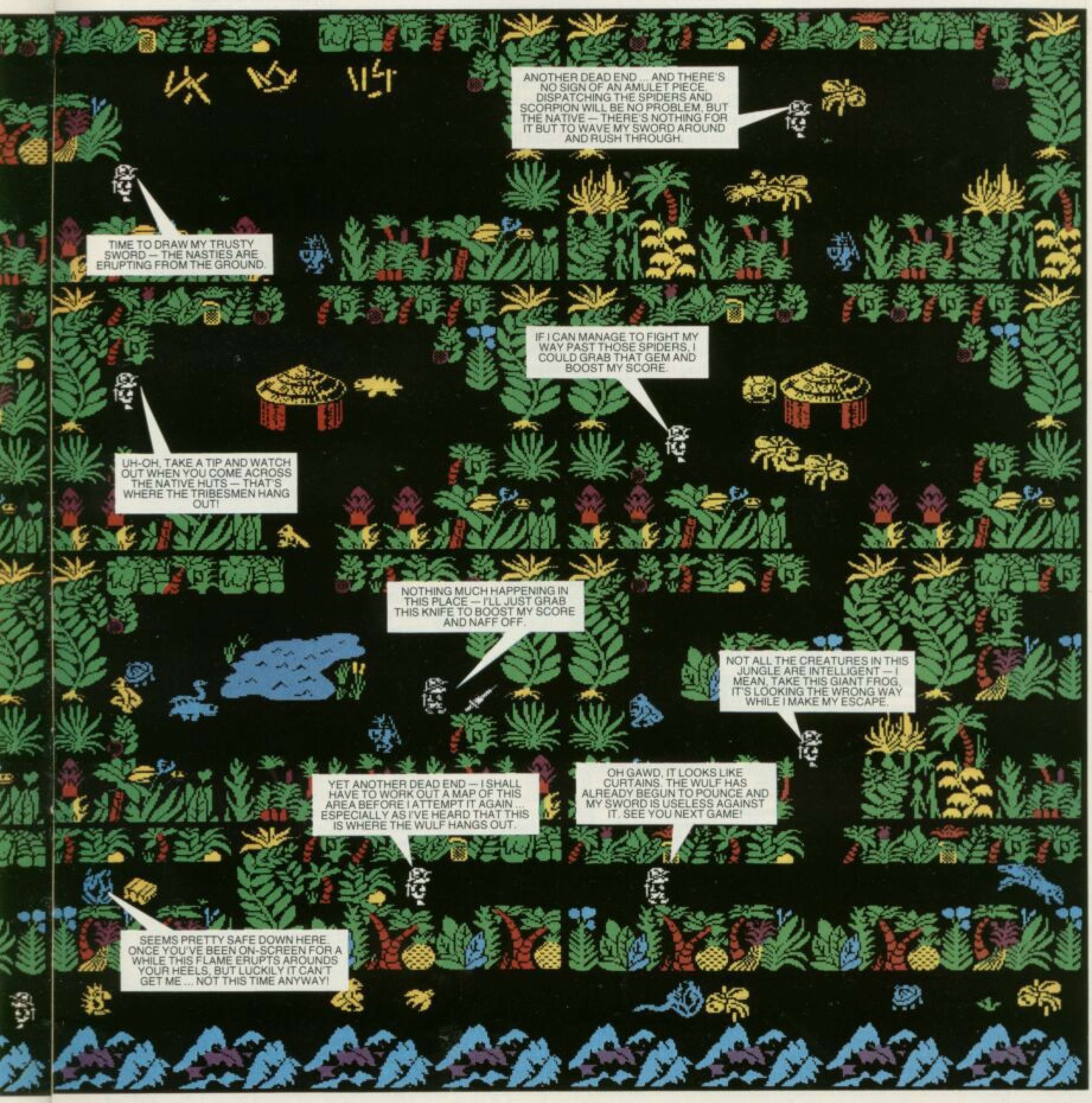
STEP INTO DANGER

Loading completed, you're met with an options screen attractively bordered by dense tropical plant life. That may look pleasant, but what's less obvious is that the keyboard controls are very poorly selected — left, right, up, down and fight are configured on the 'Q', 'W', 'E', 'R' and 'T' keys. This may be a nice easy way to do things from the programmer's viewpoint, but it doesn't help the player without a joystick; incidently, most joystick protocols are catered for.

Press the 'O' key and the action begins. Our hero, Sabre Man, is standing in a quiet clearing and soon various unsavoury jungle inhabitants are bursting through the ground (literally!) to attack him. You might at this point spot something of an *Atic Atac* influence in the way you have to move about within one 'room' at a time, fighting off nasties, then shifting off to the next in a logical way. However, in *Sabre Wulf* each room contains strips of foliage (to give it that 'outside' feel) and these are all linked by pathways; so overall, the playing area is an intricate maze, with you looking down on just a small part of it at any one time. There's a total of 256 screens that link up to create (surprise, surprise) a 16 by 16 maze bordered by threatening mountainous scenery.

The jungle creatures bent on your destruction can be split generally into two groups — those you can kill (which cannot exit your present screen) and those you can only fight off (which have a nasty habit of following you around from screen to screen). In your favour you have a trusty sabre for bumping off the smaller creatures — gaining points in the

Join Sabre Man as he takes you on a guided tour of the jungle paths; the area exploded here for your delectation is the four by four section of the bottom left-hand corner of the maze (a mere one-sixteenth of the entire map!). The 'baddies' are roughly split into two groups — those you can kill and those you can't — all depicted in glorious cartoon-type animated graphics.



process — or causing the larger animals and tribesmen to turn tail and run.

FLOWER POWER

The graphics are what we have come to expect of Ultimate — large, bright and frequently with a sort of cute cartoon-like quality (take, for example, the sleeping hippos). Most of them appear to have two stages of animation as they move pixel-wise around the screen. The exception, however, is the wulf, for he/she is a good example of what Ultimate excels at — giving characters intelligence. The wulf only inhabits a small but vital part of the maze and is extremely vicious; the other characters (though rather less virulent) can still be awkward.

Other than your trusty sword, the most helpful items in the jungle are the orchids; they grow in five different colours, blossoming and withering very quickly. If you can run over an orchid while it's in full bloom, then you'll find yourself affected by its strange powers. Ultimate has designed these to be a help rather than a hindrance. But there are two you don't want to run over — the yellow and the white: the first induces sleep for a few seconds, allowing any graphics to pass straight through you; while the other will 'cure' you of the effects of the other orchids — which is not as useful as it sounds! Of the other orchids, red allows you to run through any nasties without any harm coming to you (or it),

HACKING AT THE WULF

Hacker* Dave Nicholls *cracks Ultimate's latest wide open — but, in the end, was it worth it?

The thing that really made Ultimate's previous games stand out from the crowd for games players like me was that they gave you the opportunity to be killed off by loads of different meanies; *Sabre Wulf* certainly carries on this tradition. Before playing, I practised my swordplay to a level that would have done credit to one of the Three Musketeers — and yet entering the jungle I was immediately killed by a little red Zulu.

The encounters that followed had me being trampled by hippos, rhinos, and other lesser beasts (including several frogs — probably revenge for what I did to them in *Frogger*!) and only once did I see the Wulf himself as he flattened me from behind. This finally persuaded me that immortality would be a very desirable commodity. I postponed my quest for the Amulet and instead, with a cry of 'Hacking Away', leapt headlong into the machine code jungle in search of the fabled 'infinite lives' POKE.

BREAKING POINT

The first obstacle I had to get past was the fact that Ultimate doesn't like hackers like me and so it implements 'clever' things to the code to try and stop us. In fact, the things that it does seem pretty pointless; the method used (which I won't reveal, and is different for each game in any case) provides no protection against piracy and only takes about 15 minutes to get round. It also actually increases the loading time by about 20 seconds.

Having done the necessary, I resumed my search for the POKE, and in the course of finding it (in fact, I found two but one of them is not strictly necessary) I discovered that (due to the way the number of lives that you have left is printed out) you are limited to a maximum of nine lives at a time and any extra lives you gain above this number are ignored. However, having found the POKE for infinite lives I decided to have a quick gander at the rest of it.

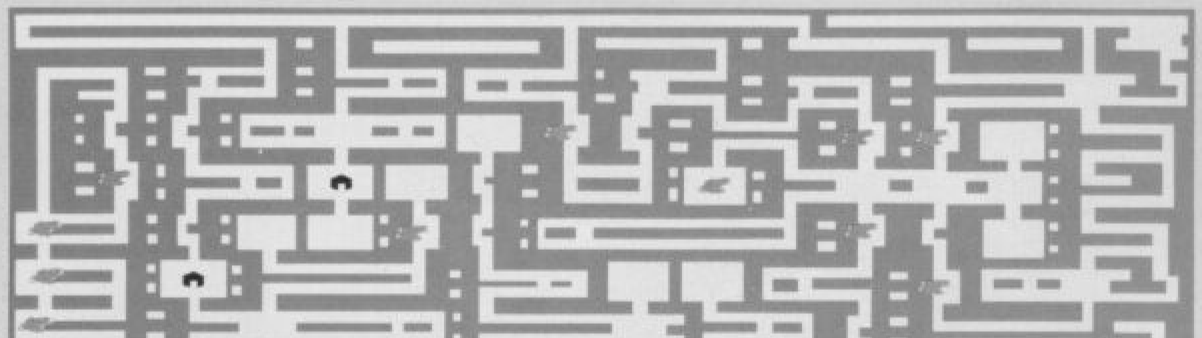
The program, as in most other games, is mostly data — but the data in *Sabre Wulf* is spread throughout the code instead of all being tucked away in one place, as is more usual. This seems to point to the supposition that Ultimate use teams of programmers each working on a separate aspect of the game. This would also explain why there are several small subroutines that use different methods to achieve the same thing. *Sabre Wulf* also fails the 'Developed on a Spectrum' test because it uses its own routines to print characters on screen for menus and so on — instead of calling the ones in ROM.

Apart from the data structure for the rooms (which I'll return to later) the program is not really outstanding... just a very professional piece of coding, even if it does occasionally use self-modifying code. (For non-hackers, this is where a program changes its own instructions as it's running — something that's generally considered bad programming practice.)

THE JUNGLE POKE

I discovered that the maze is 16 by 16 rooms in size and that there are 48 different room types within it. Each of these rooms is constructed by using separate 'data blocks' that are stuck together in different forms to produce each room; one example of such a data block is the lake that appears at various places in the jungle. I didn't count how many blocks are used in total, but I'd guess there are over a hundred — perhaps even a couple of hundred; someone at Ultimate must have very sore typing fingers from entering all that lot!

The outcome of this is that with just a few POKEs I managed to move and remove large chunks of foliage; given time (and a good keyboard) it should be possible to re-design the whole thing and have your own personalised jungle to run about in. I also considered finding a POKE that would allow me to stay cyan all the time — thus speeding up the game (as well as making me indestructible!). However, on reflection I decided that it probably wasn't really worth it. The decision later proved to be right. After about three hours searching, I finally managed to find all the bits of the Amulet and escape, making *Sabre Wulf* the first Ultimate game that I have been able to beat — even if I did have to cheat slightly.



The playing area comprises 256 screens that link up to form an intricate 16 by 16 maze; there are, in fact, only 48 different types of 'room' though when joined together they all look unique. The four pieces of the amulet are hidden in various places in the maze and, once you've found them all, you'll have to battle your way back to the home of the unfriendly statue. Watch out for the jungle path — two paths up from the bottom of the playing area — that's the lair of the Wulf!

JANET BARRANCE

cyan gives you the ability to run much faster, and the purple bloom reverses the controls (so that left becomes right, up becomes down, and so on).

TROPICAL TACTICS

One important thing to realise about *Sabre Wulf* is that jungle inhabitants appear in the current 'room' some short while after you've entered. The delay is often enough to manoeuvre Sabre Man to another exit — or at least to a strategic position (remembering that he runs faster when not in fight mode). The technique I employed was to run fast through a room, only pressing the fight key at the sound of the bleep that accompanies the materialisation of either animal or non-killable graphics. But it's advisable to be in fight mode when actually entering a room, because a rhino or similar beast may at that moment be charging across the screen. Even when using a sword, you can be killed by attack from behind — and sometimes from above or below (when in the vertical positions). It pays, therefore, to study how the different characters behave; some go straight for you while others will wait for you to move first. If you learn where they tend to appear, and how to lure them on to the end of your blade, then you're halfway to beating the game.

Another useful trick involves gaining the ability to fight off the larger animals and get past them without dying. You do it by backing them into a corner, keeping your finger on the fight key and moving closer until you can squeeze past onto a vertical path. The same approach can also get you past the tribesmen, although their greater intelligence makes it more risky; aggressive fights often result in loss of life. The other (and sometimes the only) way to get past awkward situations is to wait by a nearby orchid until it blossoms into something useful — then run straight through the blockage. Remember when doing this though, that staying in one room for too long causes an indestructable flame to start licking at your boots; you can avoid that by exiting and re-entering the room every so often.

The biggest problem you'll encounter is the wulf itself; getting past it involves either 'flower power' or trickery. The wulf patrols a long horizontal passage at the bottom of the maze which has vertical passages leading up from it. Wait under one of these until it appears on your screen, then leap down, pressing and holding down the fight key; this makes the wulf crouch until you release — at which point it'll pounce. Now move into the room above and wait until you think he'll have just gone past, then move back down and run for your life. Don't leave it too long to come back down, or the wulf will have turned around and got you for sure.

SPOT THE AMULET

Once you've mastered techniques like these you'll be able to happily explore a far larger area of the maze; in fact, you'll probably now be thinking that it's very intricate, although this is partly illusion — many of the passages don't lead anywhere at all (not even on to the next logical screen).

My experience with *Atic Atac* suggested that pieces of the amulet might perhaps lie in the same rooms each time you load the game. To test the theory, I numbered all the open rooms (the ones the pieces seem to appear in) and started playing a series of five games — finding the pieces and then re-loading. I saw no obvious way of discoverying from loading where the pieces would be, but after a while I did find a pattern of sorts. As it turns out, there are a number of set patterns and now, by checking a few rooms, I can predict what pieces are going to be in which rooms. Cutting down your risks in this sort of way makes the game easier to beat — and in many ways, more satisfying.

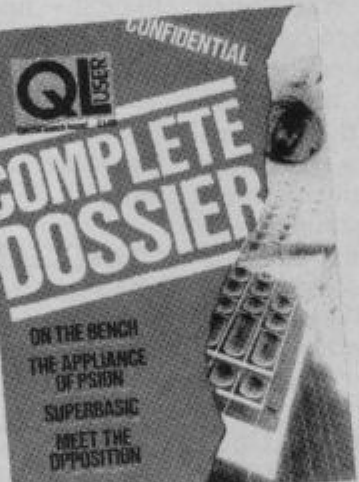
Finally, for all those whose adrenalin needs a little boost, find all the parts of the amulet and you'll be let in on a riveting secret about Sabre Man. Say no more!

CONCLUSION

The real attraction of *Sabre Wulf* is the combination of simplicity and complexity; a straightforward maze game but with elements such as the orchids to raise it to a far higher level. The graphics and animation make it fun to play on one level ... the sheer size of the playing area and all it entails means it's quite a challenge on another. YS

64~Page Upgrade For The QL ~ Available Soon!

From our Computing Correspondent



For a microcomputer that's only now starting to filter through to customers, Sir Clive Sinclair's latest brainchild, the QL, has certainly managed to scoop up its share of editorial comment in the computing press. But where, one wonders, do they manage to get information from in a situation like this? With so few QL Computers available, magazine staff must have been tearing their hair out wondering where to look next.

And yet, somehow, the publishers of one of Britain's leading micro magazines, *Your Spectrum*, have done just that. *QL User — the Complete Dossier* is what its editor Bruce Sawford calls "a 64-page, no punches-pulled, appraisal of the micro everyone's talking about".

Tracked down to his West End editorial offices, amoungst an impressive array of computing equipment (including two of the much-coveted QLs) we found Bruce, who proudly claims "This will be the one you've all been waiting for — whether you're a QL owner or just thinking about it. We're not looking to add to the criticisms of the machine, we just want to give the public what they should have had from the beginning — the complete story".

Complete with exacting tests of the hardware, evaluations of the four Psion software packages, the latest details on the modestly entitled SuperBasic, programs and news, *QL User — the Complete Dossier* has tapped the major computing journalistic talent in the UK to produce a unique look at an innovative product. Following on from the successful Spectrum computer, there are many looking to see where Sir Clive is boldly going . . . and this could be where they'll find it.

Without question, the Ql must be one of the most rumoured of machines ever launched; but, adds Bruce Sawford "This magazine is *not* a rumour; when we say it will be available on the high street street shelves within 28 days, *we* mean it!".

Rumour turns to fact~latest!

Yes, I am convinced the QL is no longer a mirage . . .

Please end me ______ copy/ies of the *QL User — The Complete Dossier* at £1.95 each. I enclose a cheque/postal order made out to Sportscene Specialist Press for £______.

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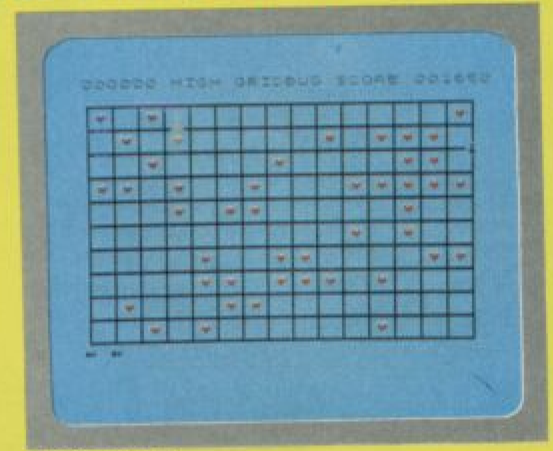
JOYSTICK JURY

Evaluating the batch this month is the Gloucester Computing Club. Any club wishing to offer their services should contact Ron Smith, Your Spectrum, 14 Rathbone Place, London W1.

This month's reviewers (all ten of them!) are members of the Gloucester Computer Club and, in alphabetical order, they are: Stephen Avent (28), Andrew Base (15), Robert Ledbury (22), Mark Manning (15), Nigel Newland (13), Peter Newland (15), Johnathan Norman (15), George Price (35), Mike Skinner (30) and Richard Vernon (15). They all set to work with Spectrum, pen and paper to tell us what's right and what's not so right with the latest new releases.

THE GLOUCESTER COMPUTING CLUB

In a moment we'll get on to the verdicts of our nimble-fingered, boggle-eyed band — to find out which new games are bound for the *YS* Top 20. But first, some details on the club. It was formed approximately eight months ago by Mr B Ledbury (who happens to be the father of Robert — one of our reviewers) and it's already built up a membership of 35 enthusiasts — ages ranging from 10 years to 'mature'. Meetings are currently held in two rooms at Mr Ledbury's home; one for games evaluation, the other for more serious studies. Membership is free and for more information, contact Mr Ledbury, 8 Linnet Close, Gloucester (telephone 0452 23186).



GRID BUG

Add On Electronics/£5.95

You're a little bug, and the aim is to stuff yourself full of strawberries. But take care to avoid the giant spiders because if they catch you, you're dead.

Mark: There's almost nothing to recommend this game — except the speed, which is just about right. The graphics are far too small and lacking in any detail, and there's hardly any use of colour. **MISS**

Mike: This is the worst game I have ever seen! The graphics are unrecognisable, the speed is too fast and it's totally lacking in originality. What's more, the sound alone is enough to make you turn off. **MISS**

Robert: It's a game that's easy to control, but still challenging. The trouble is every screen is the same, soon makes play boring. **MISS**



AD ASTRA

Gargoyle Games/£5.95

Your job is to guard and maintain the shipping lanes between the far flung Way Stations that mark the frontiers of Terran colonised space.

Johnathan: Control of this game is easy enough, but success is rather difficult because the play is quite fast. The idea isn't original, but this one takes a different angle. **HIT**

Nigel: Choice of colour is just about right, and the graphics need no improvement. But the speed is a bit of a killer at times. **MISS**

Mike: An excellent game, with equally excellent graphics — particularly the perspective view of the space craft and the shots. Although it's a variation on a familiar theme, the game is well-presented, well-executed, and very professional. **HIT**



GLUG GLUG

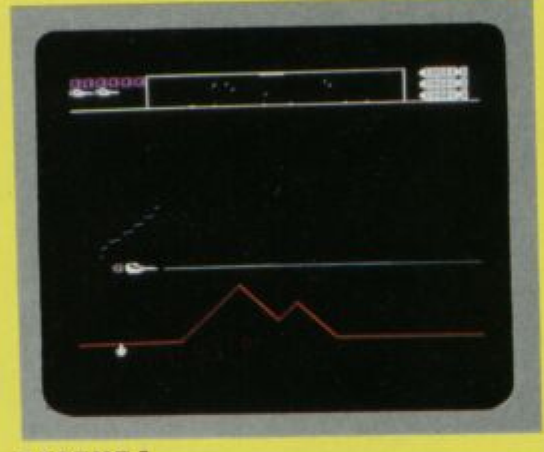
CRL/£5.95

Down on the ocean floor are goodies like gold, jewels and silver, and it's your job to go down there and get them. Naturally, the sea is full of vicious fish so you have to shoot them first, then bring up the treasure.

Mark: One look at the loading screen and you could be forgiven for thinking that this is another *Scuba Dive*. But you'd be completely wrong. The idea behind this game is very original. It's easy to play, and addictive. **HIT**

George: The graphics in this game are simple but very good. Although the idea isn't new, the game is still playable and worth buying. **HIT**

Mike: The diver is really easy to control, which makes playing the game a little more enjoyable than it might otherwise have been. The graphics are smooth and realistic. **HIT**



DEFENDA

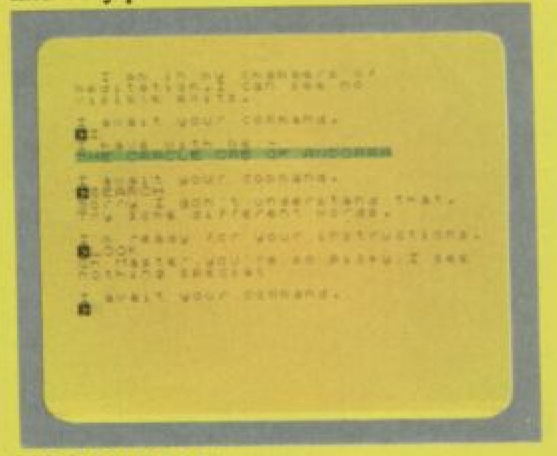
Interstella Software/£5.95

Landers, mutants, mine layers, pods, swarmers, baiters, humanoids, smart bombs and mines are the hazards you'll meet in this shoot-'em-down arcade extravaganza.

Johnathan: This is probably the best *Defender* game ever written for the Spectrum. It's really excellent, with graphics that are equal to the arcade version, and a speed that makes it very playable. The quality is stunning. **HIT**

George: Graphics, speed, colour, and so on are all on a par with other similar programs, but with a number of refinements. **HIT**

Mike: While this is a fairly good version of the familiar *Defender*-type games, it makes little use of sound, and is virtually impossible to play without a joystick. **MISS**



FIRE AND ICE

Electric Software/£4.50

This is what you might call a sensible adventure. Instead of risking your own neck, you send out your loyal disciple Zenlya, to rid the Earth of the twin demons, Fire and Ice.

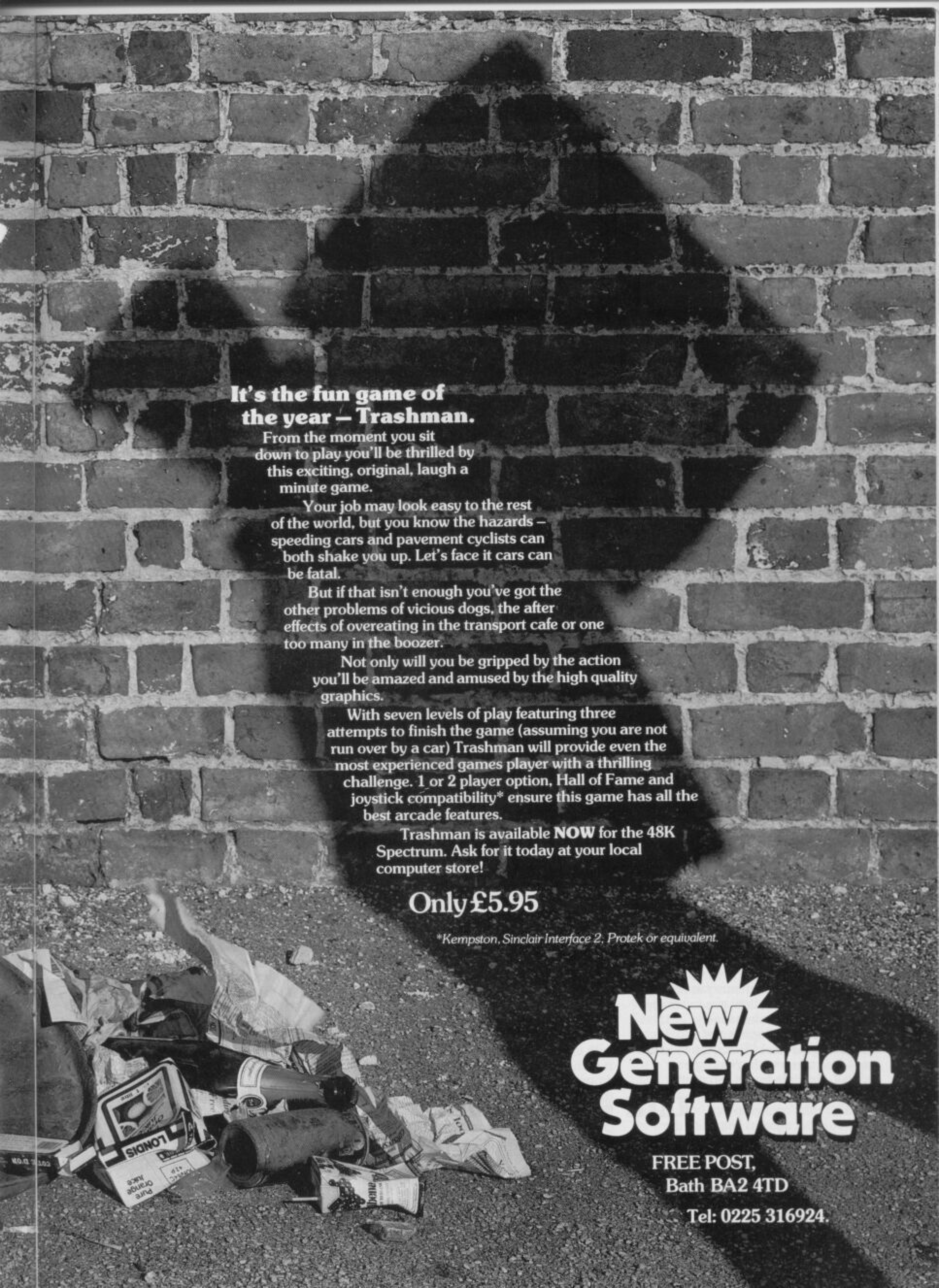
Johnathan: The program responds quickly as you command your slightly reluctant servant to carry out all sorts of dangerous deeds. The idea is not dissimilar to that of any other adventure. **HIT**

George: It's just like any other adventure — except this one tends towards the sarcy. The first response I got said, "I don't think you're going to be much good at this!" Good if you like adventures. **HIT**

Mike: Not being a lover of adventure games, I found little in this one to commend it. In fact, I'm not sure what the object is. **MISS**



Trashman
GSH
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New Generation products are sold according to their terms of trade and conditions of sale.



It's the fun game of the year – Trashman.
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With seven levels of play featuring three attempts to finish the game (assuming you are not run over by a car) Trashman will provide even the most experienced games player with a thrilling challenge. 1 or 2 player option, Hall of Fame and joystick compatibility* ensure this game has all the best arcade features.
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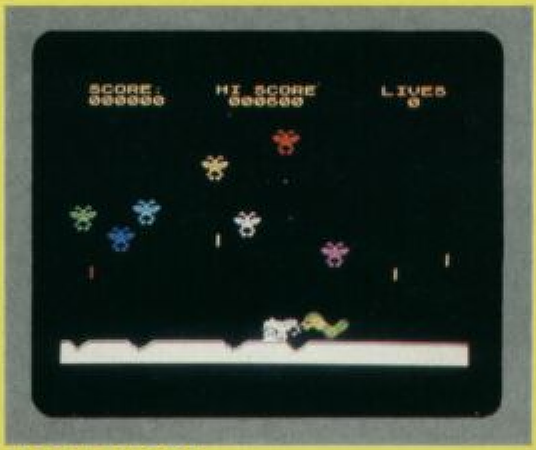
LASER WARP
Mikro-Gen/£6.95

The 'Master' has offered a challenge to you to resist his takeover of your pathetic universe. Now it's your turn to try and survive the nine waves of attack, including such horrors as Whirling Dervishes, Interstellar Pogos and Hyperspace Chickens.

Mark: The graphics in this game are quite small, but very detailed. Although the idea is just another shoot-em-up clone, the overall enjoyment is high. It's easy to reach the Master, but beating him isn't. **HIT**

Johnathan: The idea is unoriginal — really just a mixture of several other games — which doesn't hold the interest. **MISS**

Stephen: A lot of effort has been put into the graphics, and there are a good range of aliens. Playing is fun, and could be addictive. **HIT**



MOONBUGGY
Visions Software/£5.90

You've been sent to an alien world where you will be attacked by spacecraft from above and missiles. To overcome all this you have an armed moon buggy, whose only refinement is a sort of pogo stick that helps you jump across craters.

Mark: This has some of the best graphics I've seen for some time. It's a pity there's hardly any sound, but the game's very playable, and worth looking out for in the shops. **HIT**

Johnathan: It's a good copy of the arcade version, with small, smooth and very detailed graphics and a high-score table that's not too difficult to get into. The idea's fun. **MISS**

George: Well, aliens with three arms and hands might be able to handle the buggy with ease, but I as a human being found it virtually impossible. It's quite good fun. **HIT**



MUMMY, MUMMY
Lothlorien/£5.95

As a distant cousin of Nefertiti, you have spent several peaceful milleniums in your pyramid — until, that is, you were woken by Mad Clive who is an archeologist. Now you must find the 25 magic cartouches explaining the ritual for your burial.

George: Because of its originality it takes quite a while to work out exactly what's happening. It's not a compulsive game, but quite playable, nevertheless. **HIT**

Johnathan: Graphics and colour are used moderately well, and the action is fast. But these don't help make the game more addictive. **MISS**

Robert: It's a very difficult game to play, especially for the inexperienced person. However, veterans will probably love it and have no difficulty. Overall, a good game. **HIT**



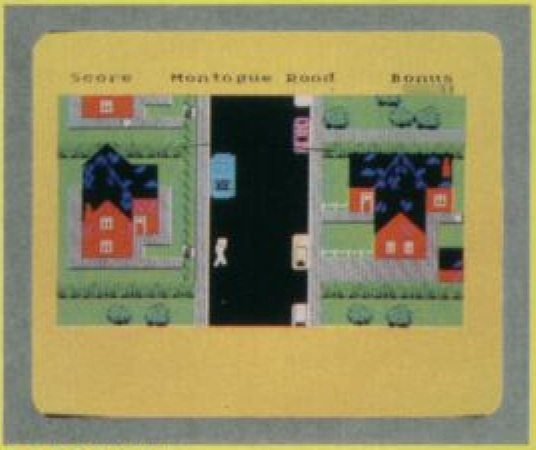
SPECGRAF
Anirog Software/£9.95

This is a utility program for the 48K Spectrum to help you design your own UDGs (user-defined graphics). It'll hold up to 200 UDGs in memory at any one time, and will also allow you to edit up to nine UDGs simultaneously.

George: It's a development of the character generator (Spectrum Horizons tape), and taken to the nth degree. Overall, a simple to use and useful utility for anyone wanting to design their own graphics. **HIT**

Nigel: Just the thing to help with the graphics if you're writing your own game. There are already other utilities available. **MISS**

Johnathan: This is a menu-driven graphics designer utility that should be a help to any programmer who's out to produce his or her own graphics simply and easily. **HIT**



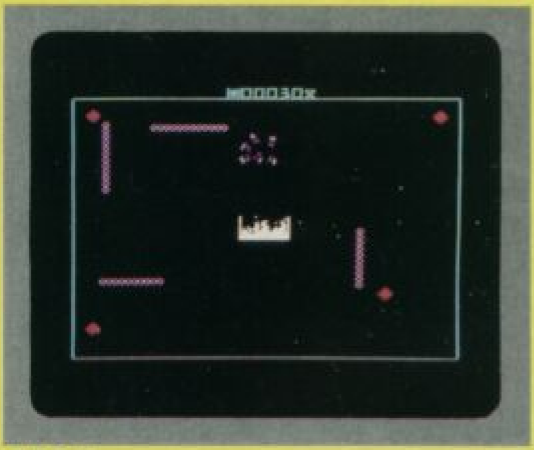
TRASHMAN
New Generation Software/£5.95

You are the dustman, and must empty all the bins into the dustcart moving slowly down the road. But watch out, some of the houses have dogs, and if they bite you the result will be a limp — slowing your progress.

Johnathan: This is a very colourful game, with excellent graphical representation. It includes some very humourous moments when you go into the houses, but it's not easy. **HIT**

Mike: It's a great game with superb graphics, a new idea and an extremely enjoyable theme. You're constantly tempted to do little jobs for the householders — not always being rewarded. **HIT**

Mark: This game can't be praised highly enough. It's totally original and the idea is brilliant — definitely one of this year's best programs. **HIT**



TROM
Dk'Tronics/£5.95

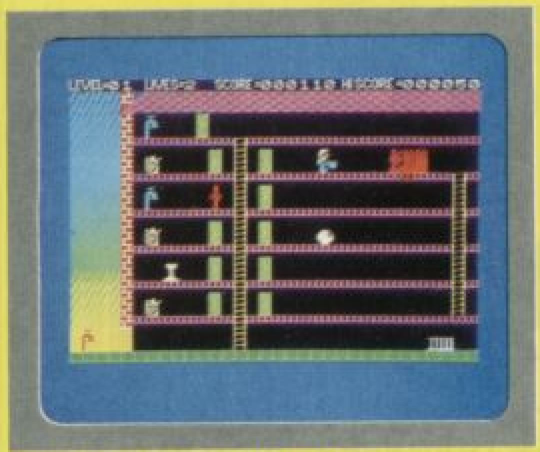
Bits lurk in the corner of the screen and you must steer your bitsearcher towards them to collect them. That done, you take all the bits to the furnace to incinerate them. But watch out for the bytes and the poisonous pixels.

Stephen: The graphics are very good, especially the incinerator which looks quite real. It's not too difficult to play. **HIT**

Mike: The idea behind the game is unusual but not particularly inspiring. There are three speeds — two are playable, but the other is far too slow. Generally, it's a very average game. **MISS**

Peter: The colour here is fairly basic and doesn't change from level to level. And the graphics are startlingly dull except the incinerator. It's only compulsive at first. **MISS**

JOYSTICK JURY



INFERNAL COMBUSTION
Strange Loop/£4.95

The aim here is to run around a house putting out fires, using either a bucket of water or a fire extinguisher. The bucket, of course, needs filling up from the taps. You can pick things up for bonus points.

Mark: The idea of putting out fires is quite good, but the finished product doesn't really match. The speed, sound and colour can be described as pleasing. **MISS**

George: This is an original scenario for a computer game, but it could have been improved by making better use of colour and graphics. **HIT**

Robert: The graphics could be better, colour is used well to make the fires and all the action seems very real, but not overpowering. Unfortunately, the scoring is rather difficult to understand and, for me, still remains a mystery. **MISS**



SORCERY
Virgin Games/£5.95

You are the last of the great sorcerers and must travel to Stonehenge and rescue three fellow sorcerers from the evil necromancer. On your way you'll find objects that may or may not be of use. Only one of these will destroy the necromancer.

Richard: This is a really well thought-out game where you travel from screen to screen. Both graphics and colour are used well and the game responds well. **HIT**

George: It's not very often we see action mixed with adventure all in one game. But this is what Virgin has done, and the result is very good indeed. This is a chart-topper. **HIT**

Mark: This game reminds you of Imagine's *Alchemist*, and is very nearly as good. In fact, I couldn't stop playing it. **HIT**



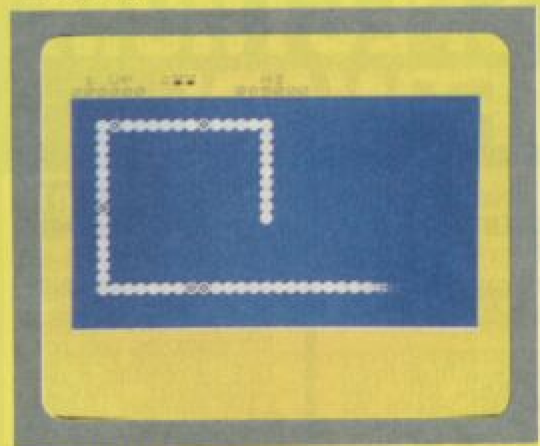
DISCO DAN
GEM Software/£4.95

Your mission is to de-activate some highly unstable nuclear reactors orbiting in space. You are taken to the first by a patrol ship which drops you in a hyper-tunnel.

Johnathan: The graphics in this game are none too clear; they could have done with more effort being put into their design. Perhaps a better choice of colours would have improved visibility. **MISS**

Mike: Excellent graphics, very playable speed, good choice of colour, an interesting idea, and reasonable sound make this one of the best original games around. **HIT**

Andrew: A fairly original game based on one of the most boring ideas I've heard of for ages. Added to this the action is much too fast, with too many instructions. **MISS**



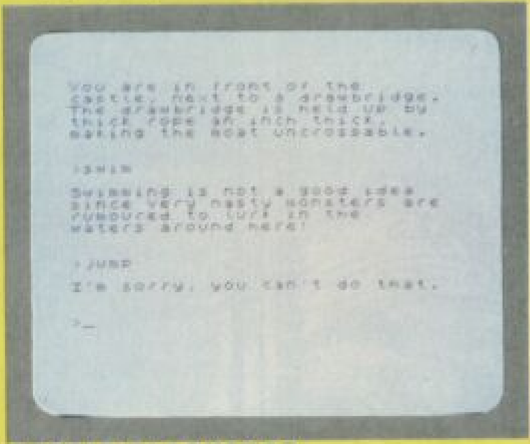
DEFUSION/WORMS
K-Tel/£6.95

The aim of *Defusion* is to defuse a bomb that's ticking away at the centre of a number of paths, some of which are booby-trapped. *Worms*, on the other hand, has you controlling a growing worm.

Richard: The graphics in *Defusion* are fairly basic, but the use of colour makes up for it. Also, the play speeds up as successive levels are reached. It's much the same with *Worms*, although there the idea is not in the least original. **MISS**

Robert: Defusing a bomb is a good idea for a computer game, but poor execution makes it an average offering. *Worms* isn't a lot better. **MISS**

Stephen: Technically, there's nothing wrong with *Defusion* — it's simply not very addictive, and becomes boring after just a few attempts, *Worms* is a little better. **MISS**



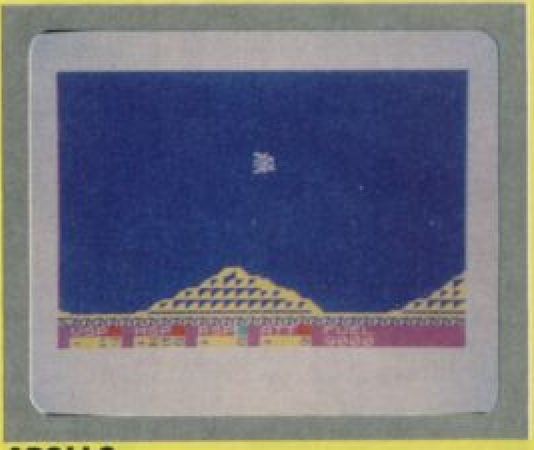
CASTLE BLACKSTAR
SCR Adventures/£6.95

You wake in a strange room that's furnished with silver and glass: out of the windows you can see landscapes of staggering beauty. However, there's a tall woman telling you to go recover the Orb from Castle Blackstar; you may keep any treasures you find — once she has cleansed them from evil.

Andrew: One of the best text-only adventures around, featuring a medieval castle and many unexpected and hidden extras. **HIT**

Johnathan: If you go down to the woods today you'll get lost in this puzzling adventure. **MISS**

George: There's a feeling when playing this adventure that the programmers responsible had a great deal of fun writing it. There's something of a Smart Alec tone, but it's still fun, if frustrating, to play. **HIT**



APOLLO
Darkstar/£5.50

As pilot of a Lunar Exploration Module, your mission is to land safely on the moon. But the on-board computer has broken down, so you've got to land your craft manually.

George: This is far from being an original idea. However, the space module behaves as you would expect, and there's a sense of achievement when you to land. **MISS**

Mike: There are plenty of 'lander' games around, and this one's probably one of the best. Particularly impressive is the way the screen switches to close-up when you bring the craft near to the ground. **HIT**

Johnathan: Landing is not very easy at all, which makes success all the sweeter when you manage it. The graphics are very smooth. **HIT**

INPUT/ OUTPUT

Once again, we're throwing out the pages of *Your Spectrum* for a worthy cause. Like most of us, you've probably got loads of odd bits of hardware and software around your bedroom that just gets in the way. Well, here's a way to solve your problems. . . and get something you want into the bargain.

Simply fill in the form at the bottom of the page and tell us in not more than 30 words what you've got up for grabs and just what you want in return. Try and give as much information as you can within the 30-word limit — don't worry about your address if it's too long, just provide a 'phone number you can be reached on.

Of course, this isn't just limited to swopping software, you can also publicise your club or advertise for a pen pal. Just give a rough idea of your interests and let them get in touch with you — could be you'll find a friend for life!

There'll be no charge for anything placed in the magazine — just keep it relatively clean (the Editor has to read all the entries, you know) and keep 'em coming! We like to know we've got some interested readers out there. . .

Fill in the form below, specifying in which category you'd like your ad to be included, and send it off to INPUT/OUTPUT, *Your Spectrum*, 14 Rathbone Place, London W1P 1DE. Please use CAPITAL LETTERS and keep your copy down to a maximum of 30 words (including your name and address or 'phone number).

Use a photocopy of this form if you don't want to deface your issue.

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In pursuit of the definitive games book,* Phil Cornes *and* Mike Turner *corner a selection of tomes, getting to grips with them all, be they good, bad or just plain ugly.

GAMES PEOPLE PLAY

Many years ago, when you could still buy 16K of dynamic RAM for approximately £240, I drove all the way from my home town of Stoke-on-Trent (which didn't have a computer shop) to Liverpool (which did), simply because Microdigital was selling a book of games listings. The title was, as I recall, *What To Do After You Hit Return* and, for my money, the star listing was a version of *Wumpus*.

To be asked, then, to review some eleven books of games for the Spectrum (with its super Hi-res colour screen and Z80A processor) should have been little short of a pleasure. Little did I know! I found that not only did the games frequently take little advantage of the startling advances in video presentation, but — worse — often had no 'meat' about them at all.

DOWN TO BUSINESS

First off the pile came *Games To Play On Your ZX Spectrum* by Martin Wren-Hilton. The listings have been typeset and may therefore contain syntax errors, but your Spectrum will tell you about these when you try to type them in. There's nothing actually exciting in the book and, indeed, the author even admits that one of the listings is the first game he ever wrote! One consolation is that at £1.95 you'll have wasted the least possible amount of money.

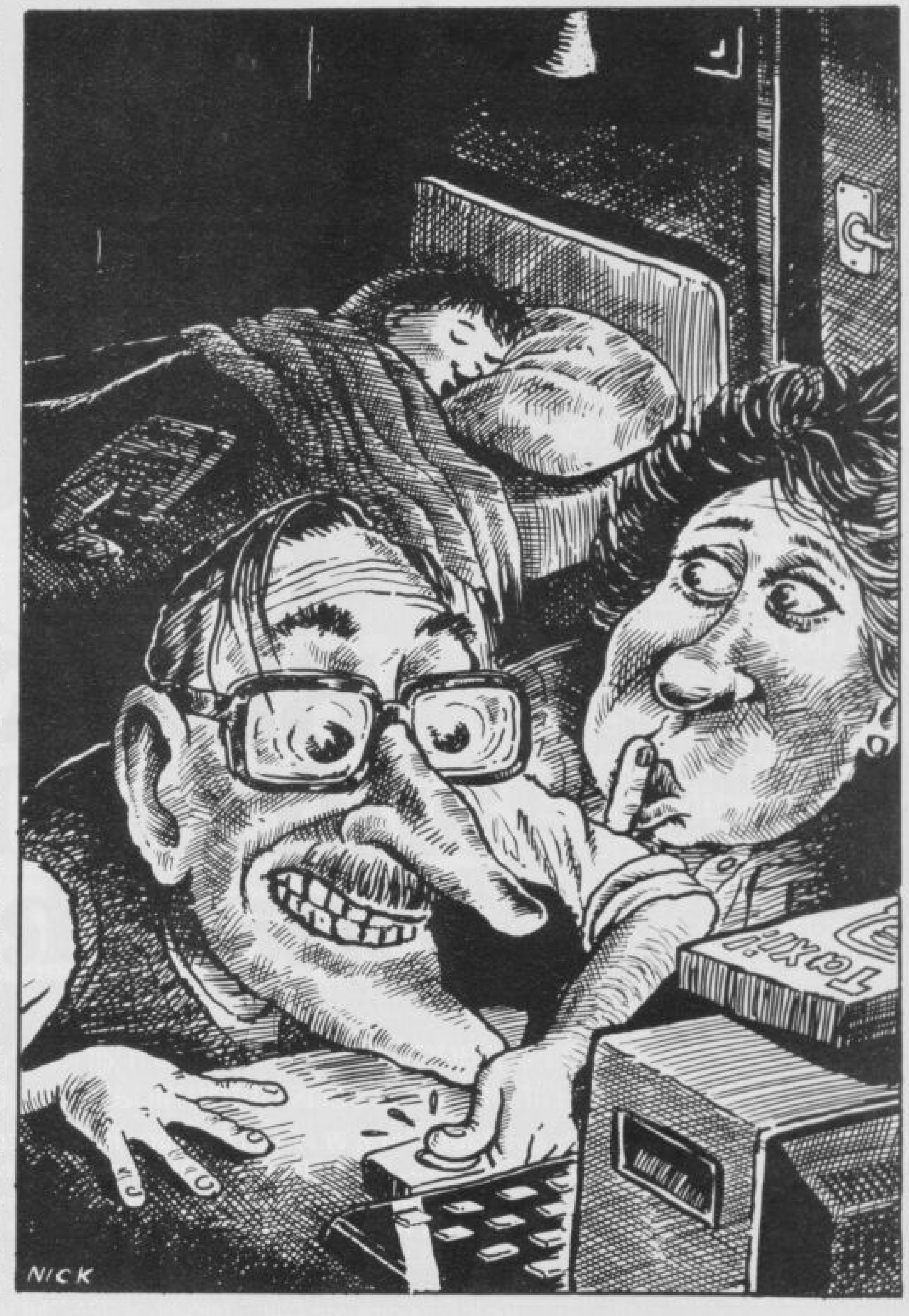
The Spectrum Book of Games by Mike James and various others has listings printed on a reasonable quality dot matrix printer. However, these appear to have been wordprocessed and so the same comments as above apply regarding syntax errors. Once more there is nothing outstanding in the selection of games (*Fruit Machine, Noughts and Crosses* and a dice simulator, for example) although the presentation is good. Objectives for all the games are clearly detailed, together with advice on how to play them, typing-in tips and a list of the main subroutines and details. All well and good but the whole thing is wasted on a poor selection of games. At £5.95 I really can't describe it as particularly good value for money.

60 Games and Applications for the ZX Spectrum by David Harwood is split approximately 50/50 between the author's two groupings. The utilities vary from an eleven line idiot's remember routine (which only changes program line numbers, ignoring GO TOs and GO SUBs, etc) to a correlation/regression program which produces a value for Pearson's Correlation Coefficient and the linear regression equation, but which requires you to enter all the X co-ordinates followed by all the Y co-ordinates, rather than the more usual X, Y pairs. Equally the games range from a version of *Breakout* with ZX80 style graphics and a ludicrously complicated set of instructions for running and typing-in, to a version of noughts and crosses which "unlike many ... allows you to win"(!) and forces you to start on the centre square. At £4.95, and despite a reasonable *Draughts* program by Tim Hartnell, this book again represents dubious value for money.

ALL KINDS OF EVERYTHING

Spectrum Spectacular by Roger Valentine has 50 programs, fewer than 20 of which are games.

There are some useful machine code routines given as both Basic programs and as assembly listings, although these are poorly documented and contain errors. For instance, in one perfectly good left and right scroll routine, the author suggests a couple of modifications for 'fun' effects. One of these, using the SRA instruction to clear the screen with a 'venetian blind' effect, will not work in all



NICK DAVIES

cases. Replacing the SRA with an SRL (203,62 in decimal) cures the problem. At £4.95 this seemed fair value for money.

Instant Arcade Games for the ZX Spectrum by Jean Frost at £3.95 is indeed good value. It's not, however, a book of games listings in the more conventional sense. Take the 'control program listing' for a typical space arcade game; each individual subroutine (producing the backdrop — stars, night skyline and so on — calculating fuel reserves, laser status, and checking for the game endings) is formulated. Then add to this a collection of user-definable spaceships, aliens and tanks with both Basic listings and pictures. Not bad, eh?

Following chapters are on writing your own games and designing your own characters. It's a publication that caters for the two mainstreams of games playing and it definitely comes as recommended reading.

Also highly recommended is *Sixty Programs for the Sinclair ZX Spectrum* by Robert Erskine and friends. It's a larger format book, making it easier to read than most; on the other hand one or two of the games are of questionable taste ... like *Exocet — Let's Play Falklands.* This really is the only aspect that lets down an otherwise excellent collection of games of varying length and complexity. They range from *Countabout,* a counting game for two-to five-year olds, to such substantial offerings as *Asset Stripper* and *Evolution 1, 2 and 3.* All in all at £4.95 this takes the top spot for best value for money of the pure listings books.

FREE EYE-STRAIN WITH EVERY COPY

Next up we find *Creating Arcade Games on your ZX Spectrum* by Daniel Haywood, a book let down by the variable quality of its listings. These appear to have oozed out of one of the poorer ZX Printers and in parts they're so faint as to constitute a source of severe eye-strain — particularly when struggling with long multi-statement lines. But one or two of the games are of a reasonable standard, explained in depth and supplied with lists of the variables used — together with the functions they serve in the game: this is the book's strongest point. Typical of the contents are *ICBM,* a version of missile command, and *Scramble.*

Now let's don protective clothing and really plumb the depths. By any standards, a 64-page book containing 20 trivial programs at just under £7 cannot be classed as good value. Richard Attwasser's *Twenty Programs for the ZX Spectrum* is, unfortunately, just such a book. Old chestnuts such as *Breakout, Android Man* and *Mastermind* are typical of the contents. There's even a program for storing telephone numbers — always a questionable use for cassette-based micros which are switched off most of the time or even dismantled; sorry, but a card index is still far more efficient. A cassette of the games in the book is available for an additional £2.95, so at a combined price of £9.90 for both book and cassette, this comes close to robbery with violence.

Back in the land of thick tomes with lots of listings, *49 Explosive Games for the ZX Spectrum* by Tim Hartnell *et al* proves to be another victim of the ZX Printer. The listing of *Frog on a Log* (starting on page 133) is surely the worst example of random pixel plotting in any of the eleven books; novice programmers will have little chance of entering it without errors. There are several mammoth adventure listings — *Doors of Doom* stretches over twenty-four pages (no, I didn't test it!). There are Space games, two-player games, mazes and arcade games, as well as two sections of utility programs in machine code and Basic. One of these is a tape copy program and one has to question the ethics of publishing this, even if it does lack sophistication and will only work with certain machine code programs.

EVERY PICTURE...

Over the Spectrum (edited by Philip Williams) contains 30 programs; two-thirds of which are games — colour screen photographs are included showing most of them in action. The assortment is varied ... in fact, if anything, it attempts to cover too much ground. *Freeway Frog, Fruit Machine* and *Alien Invaders* vie for space with *Sales Analysis, Payroll* and *Block Line Delete.* It is not entirely clear who this book is aimed at. Still, some of the games have excellent graphics, including *Draughts* (which has a machine code routine for sorting out the computer's move) and *Chess.* The latter is not very intelligent and plays quite slowly; in fact, the author even suggests amending the program so it can be used as a human versus human game. There's also a 30-location, eight-problem adventure for those with the patience to type it all in, plus solutions for those who lack the wherewithal to play it. At £6.95 this book leans towards being over-priced.

Finally, reasonably priced at a mere £2.95 is *Games for your ZX Spectrum* by *YS's* own Peter Shaw. Twenty-four games are included, all rolled out from yet another temperamental ZX printer (somebody must have the good one, surely?). The games are all fairly short, although some are quite interesting. *Pontoon* has good graphics, as does *Ascot,* a horse race program. However, by far the best section of this book is a detailed chapter entitled 'How to write better programs'. Here you'll find some good material on writing a fairly complex strategy that uses as an example a game called *Dome Dweller.* In a similar manner to the Jean Frost opus, series editor Tim Hartnell gives a listing for the main control loop, a collection of things the program has to do and a fairly detailed description of the variables to be used. This alone is almost worth the cover price.

In addition, there's a glossary and bibliography — which aren't necessary and don't appear to bear any relation to the rest of the book. With these two rogue sections exorcised and 50-75p off the price, Shaw's book would represent excellent value for money.

PICK OF THE BUNCH

Looking back over the eleven books for this month, they would seem to fall into four quite distinct groups. Top of the bill, and living up to all my expectations are: *Instant Arcade Games for the ZX Spectrum* and *60 Programs for the ZX Spectrum.* These are the two that no Spectrum owner should be without and they represent the modern equivalent of the ideal tome I yearned for many moons ago.

The next four books, represent good value for money. They are: *49 Explosive Games for the ZX Spectrum, Spectrum Spectacular, Creating Arcade Games on your Spectrum* and *Games for your ZX Spectrum.*

The third block includes *Games to Play on your ZX Spectrum, The Spectrum Book of Games, 60 Games and Applications for the ZX Spectrum* and *Over the Spectrum.* These four come into my 'lukewarm' category. The reason for their downgrading are varied, ranging from 'good game presentation wasted on poor games' to 'generally good but over-priced'.

The final category contains only one entry. I doubt that anyone could seriously challenge the fact that the one remaining title is just a waste of paper at the asking price. I stoop to mention the title again. YS

We looked at ...

Instant Arcade Games for the ZX Spectrum
by Jean Frost, Pan books
ISBN 0 330 28265 4, £3.95
60 Programs for the Sinclair ZX Spectrum
by Robert Erskine & others, Pan books
ISBN 0 330 28260 3, £4.95
49 Explosive Games for the ZX Spectrum
by Tim Hartnell, Interface Publications
ISBN 0 907563 53 8, £4.95
Spectrum Spectacular
by Roger Valentine, V&H computer services
ISBN 0 946008 03 5, £4.95
Creating Arcade Games on your Spectrum
by Daniel Haywood, Interface Publications
ISBN 0 907563 28 7, £3.95
Games for your ZX Spectrum
by Peter Shaw, Virgin books
ISBN 0 907080 84 7, £2.95
Games to Play on your ZX Spectrum
by Martin Wren-Hilton, Shivas Publishing
ISBN 0 906812 28 3, £1.95
The Spectrum Book of Games
by Mike James & others, Granada
ISBN 0 246 12047 9, £5.95
60 Games and Applications for the ZX Spectrum
by David Harwood, Interface Publications
ISBN 0 907563 17 1, £4.95
Over the Spectrum
by Philip Williams, Melbourne House
ISBN 0 86759 112 9, £6.95
20 Programs for the ZX Spectrum
by Richard Francis Altwasser
ISBN 0 95087658 2 1, £6.95

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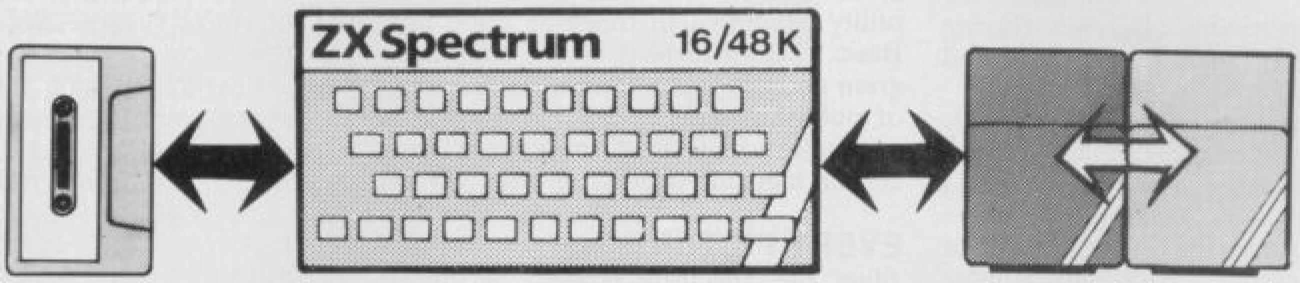
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ROMANTIC ROBOT 113 Melrose Ave, London NW2

QL User appears each month within the pages of *Your Spectrum.* Look out too for the 'Complete Dossier' edition — in the shops now!

UPGRADE YOUR QL

For those who want the complete story so far on the QL, there's a sister publication to *Your Spectrum* called *QL User The Complete Dossier* now available and priced at £1.95.

Its 64 pages provide exacting tests of the hardware, evaluations of the four Psion software packages, the latest on the modestly entitled SuperBasic, plus programs and news. Tapping the major computing journalistic talent in the UK, *QL User: The Complete Dossier* takes a unique look at an innovative product.

You'll find the magazine available in the shops now, or you can get it from us by simply sending a cheque/postal order for £1.95 to *QL User: The Complete Dossier, 14 Rathbone Place, London W1P 1DE* for each copy you want.

PUBLISH — AND BE DAMNED

Pitman Publishing Ltd and Boris Allan have definitely hit the line first with *The Sinclair QL Companion*.

Not only is this the first of many QL orientated books to reach the public, it's also managed to sell out in record time. Unfortunately, there's often a price to pay for such 'fleet of foot' publishing action — quality can become directly proportional to the time taken to write it; and in this case, quite a few people believe that Boris has blown it!

In trying to get this particular title to the shops first, it's a fair guess that he relied heavily on preliminary documentation (now considerably changed) and the experience gained directly from other projects. For instance, a chapter on turtle graphics seems to have been lifted straight from a previous book (his Logo one) and although the program examples have been changed to reflect the capabilities of SuperBasic, the whole thing is now redundant. Why? Because SuperBasic now contains all the keywords and functions necessary for performing turtle graphics.

And there's a section on the Intel 8049 processor (for keyboard and other associated processes) which is useful, but only five pages in length. That's hardly a good enough reason for spending £6.95.
Nigel Cross

KLUDGELESS AT LAST

Quicker than expected Sinclair Research has shifted the errant 16K of hardware back to where it should have been in the first place, inside the case.

Normally it takes several months to 'burn' a new ROM and bring quantity supply up to a reasonable level. Sinclair, however, has taken a quicker route and, for the time being, has kept the whole thing on EPROM, the new 16K being piggy-backed onto the existing 32K.

These days, the normal retail price for a 16K EPROM is around the £9 mark; but the cost of the 32K version is something else altogether and enquiries among the cognisenti reveal a retail price of up to £80! However, Sinclair Research claims to have 'done a good deal'.

Anyway, with the Kludge out of the way, at least the company is less likely to be mauled by adverse publicity With Uncle Sir Clive strongly touting his new wares in the direction of the BBC, it could be argued that satisfaction is now the name of the game; in addition, of course, the move releases the cartridge port for programs on ROM — all that's needed now is for the software houses to play ball.

The code for the latest version of SuperBasic is 'AH'. To check whether that's what you have, Print VER$. Those who've been blessed with the latest edition say many of the previous problems really have been erased; it's now, for instance, nothing like so easy to crash the machine.

SINCLAIRWATCH

BY GUTTERSNIPE

Now the QL has been around in its various forms for quite a while, the infamous Sinclair Research 'returns' service is beginning to reveal its QL tactics. Those with problems of a Psion package nature — regular crashing, perhaps — find that contacting Sinclair Research seldom proves fruitful. As soon as you mention the word 'Psion', the reply is "it's nothing to do with us", and that you should contact Psion itself for an upgrade. However, if you haven't paid your £35 to be a QLUB member — too bad — you'll just have to pay for a replacement.

I've even heard vile and nasty rumours that some, so sick of crashes and non-functioning of a program, physically damage the tape in the cartridge in some way — from subtly leaving it in the drive while repeatedly connecting and disconnecting the power, to the earthy process of wiping dirty hands on the tape itself! Once the tape is corrupted so that it won't load, Sinclair Research are legally bound to replace it under guarantee — and the theory is you'll get the latest version. Despicable I call it.

There could well be a large potential market for EPROM copiers on the QL at the moment — so that users can upgrade their machines themselves. All you need is quick access to a QL with the ROM (or EPROM) version you desire, then just plug the copier into the back of it together with some blank EPROMs, and copy your mate's firmware straight on to them. Then unplug it, take your new EPROMs home and plug them in.

One recent example of the strange attitude of Sinclair Research to software compatibility is the implementation of the AT command. This is used to position the text cursor on the screen, and was originally intended to be followed by first the y position and then the x position. However, the first version of SuperBasic went out to customers with the opposite syntax, namely x first followed by y. Someone noted this discrepancy and, instead of including a note on the ever-growing Addenda sheet to the 'official' manual, decided to change the subsequent Basic; the end result is that the AT command works rather differently on each version of the QL. Now the latest Psion programs test to see which Basic is installed, so they know which way round to put the parameters. One hopes that other misprints in the manual — of which there are many — will not be corrected by changing SuperBasic to suit!

On a lighter note to end this month, hands up those who'd like a good laugh. First grab your QL manuals — provisional or otherwise — and turn to page 30 of the Concepts chapter. As part of the 'general care' section you are told 'NEVER touch the cartridge while the drive is in operation'. Good advice you may say, until you check out the warning at the bottom of the page ... 'If you attempt to write to a cartridge which is write protected then the QL will will repeatedly attempt to write the data. Remove the cartridge to stop the QL'. What!!! Of course, you may have the edited version of the manual like our Troubleshootin' Pete — he's just had the relevant page ripped out; it's good to know that Sinclair Research has its finger on the pulse.

THE PSION WRITERS


"Anyone can have the Abacus package up and running within a matter of minutes."
COLLY MYERS

If you subscribe to the motto, "It's the software that maketh the hardware", then Psion have a lot to answer for. Surya asked the authors of the QL's bundled software, Charles Davies *(Archive),* Martin Stamp *(Quill),* Martin Brown *(Easel)* and Colly Myers *(Abacus), what they'd set out to achieve.*

The QL's 'free' software packages together provide the four most common areas of business application – wordprocessor, database management, business graphics and financial analysis. And yet for the company writing these programs, this was its first real foray into the cut-throat world of business software. Charles Davies, Psion's technical director and author of *Archive*, explains how Psion managed to win the contract in the first place.

"Sinclair contacted a number of companies at the beginning of 1983. At the time, they were extremely vague about the machine just that it would 'probably be 16-bit'. They invited us to submit proposals for a suite of business software."

Psion has apparently already made the decision to move into the business market, and was working on four packages. "Since we'd already given the matter a lot of thought, we were able to give Sinclair detailed proposals, which they accepted."

At the beginning, Psion knew nothing about the machine at all – not even what the processor was going to be. Davies, however, doesn't feel that it was the handicap it might at first seem. "The development work was done on our VAX systems," he explained. "Since the packages are written primarily in C, it didn't particularly matter which processor was chosen."

Psion owns two VAX superminis, which the company uses to develop most of its software. The attraction of carrying out development work on a VAX is clear enough; why work on a home micro with a poor keyboard and no debugging software in assembler, when you can work in a professional programming environment in C? And – perhaps equally important in an industry where it seems almost common practice to launch first, design later – you can actually develop software before the hardware exists.

Sinclair has stuck by his much-quoted statement that he was not aiming for a specific type of user, and that "the market will decide" where the QL's future lies. But was Psion given an image of the typical user? "I suppose you could say we were given the 'granny in a sweet shop' image of the user," says Davies. "The packages had to be easy to use for someone with no experience of or interest in computers. The whole emphasis was on sitting down and using the packages from day one – without needing to refer to the documentation. We all know the 'if all else fails, read the manual' attitude; we tried to work with this attitude instead of against it.

"We've provided substantial 'in-context' help facilities in all four packages. The prompt box at the top of the screen tells you exactly what you can do at any time and provides brief prompts. And the in-context help screen can be called for more detailed instructions."

"The main problem with Quill was space; we wanted to cram a lot of features into a small area."
MARTIN STAMP

Using a VAX for development work is all very well, but there's a limit to how much work can be done without the target hardware. How long was it before Psion received its first QL? "We were given a rack system in the summer of '83," Davies says. "This had no Microdrives, of course, and we still didn't know exactly what the keyboard would be like. But in all other respects the system was a QL.

"We didn't receive a copy of QDOS until a few weeks before the press launch in January. We had the choice of writing our own operating system to work with, or waiting for Sinclair to produce QDOS. Knowing it would be foolish to wait for Sinclair to produce



TONY SLEEP

QDOS, we developed our own operating system for development and testing, substituting QDOS when it arrived."

We now know that at least some of the delays in producing the QL were caused by hardware problems. But some have said, too, that there were bugs in the Psion packages.

"The Sinclair hardware was delayed, so we used the time to improve the specifications of the software. There were a lot of different versions of both the hardware and the Psion packages, and this caused problems of compatibility. But the versions which have gone out to customers are fully working."

Archive: Close To Basic

Switching to the individual packages, the database program, *Archive*, seems noticeably different from the other three. *Quill*, *Abacus* and *Easel* are all very easy to use from the first few minutes of sitting down with a QL. *Archive* seems less friendly.

"With the three other packages," Davies explains, "our prime concern was ease of use. In some areas, we've sacrificed some of the more obscure features for the sake of simplicity. With the database, however, we found from talking to experienced users that what they want is power. For this reason, we decided on a language-

THE PSION WRITERS

driven system. This is inherently less friendly than a menu-driven, single-key system, but provides the sophistication that we know users want.

"The *Archive* programming language was designed to be as close to Basic as possible; if users know any programming language, they'll know Basic."

Given the similarities between the *Archive* programming language and Basic, I suggested to Davies, why not simply let users program the database using SuperBasic?

"The *Archive* programming language is much easier to use. It provides full prompting and in-context help at all times. You also get a lot of dedicated commands, like automatic sorting. There's a full editor, though you could of course use *Quill* if you prefer. Basic programmers will find very little difficulty with *Archive*, but we have to cater for inexperienced users too."

It's clear that much as the Psion packages are aimed at inexperienced users, the QL has also attracted a lot of interest from hobbyists. Does Davies see the QL as a programmers' machine?

"I don't see the QL as an enthusiasts' device; it's being marketed as a 'plug-in-and-go' system, and this is where I think it will make its impact."

Stamp On Quill

Perhaps the most important package in the suite is the wordprocessor, *Quill*. While not everybody will be impressed by the benefits of holding one's address book in a database, or balancing the cheque book with the aid of a spreadsheet, almost everybody can see the advantages of a wordprocessor – even if it's used only for writing letters. I asked *Quill's* author, Martin Stamp, about the problems involved in writing the package.

"The main problem was space; we wanted to cram a lot of features into a small area. With the relatively slow speed of Microdrive access, we couldn't rely too much on overlay files. The bit-mapped screen presented both problems and opportunities. The slow speed of writing to the screen meant that we couldn't subscribe to the 'when in doubt, redraw the screen' school of programming. We had to keep track of what was on the screen at any given time. But it has its compensations, enabling us to display underlining, superscripts and subscripts and so on."

Quill has been criticised for its lack of features. For example, once in block mode, you have to use the cursor keys to define a block of text. This is a very slow method of defining a large block of text. How would Stamp answer these criticisms?

"The emphasis throughout the wordprocessor was on ease of use. We didn't want lots of complex features that nobody ever uses. You won't find a paragraph-delete function, for example. It would be too much power; people can go terribly wrong that way.

"Block definition is achieved using the cursor keys so that users can see what they are doing. Experienced computer users are quite happy with abstract concepts – they know that the block has been defined, even if they didn't see it happen. But when a beginner does something, he wants to see it happen. That way, he's sure."

> *"I think the QL is appropriate to business users", says Stamp, "I can see it competing with much more expensive machines."*

Quill supports the importing of files from the other packages, but not vice-versa. "It's just not something we feel to be appropriate," says Stamp. Does he really see the QL competing with machines like the IBM PC and the ACT Sirius? "Yes," says Stamp, "I think the QL *is* appropriate to business users. "I can see it competing with much more expensive machines."

Friendly Abacus

Psion claims to have gone out of its way to make the four packages both powerful and easy to use. I asked Colly Myers, author of *Abacus*, what that means to a spreadsheet. Isn't it a case of see one, and you've seen them all?

"We feel that *Abacus* is much friendlier than most spreadsheets. There's none of this 'cell D45' business. If you want to refer to the cell containing the profits made in March, you simply specify 'Profits. – March' and *Abacus* will find the cell where the row marked 'Profits' crosses the column marked 'March'.

"As with the other software, *Abacus* is intended to be simple to use. Anyone can have the package up and running for straightforward applications within a matter of minutes. But the more complex and powerful features are there when you need them. And as with *Archive*, we've used Basic functions wherever possible since these – if anything – will be familiar to the user. So to find the length of a cell's contents, for example, you use LEN. We think that *Abacus* compares well with traditional spreadsheets in terms of speed and power, but is friendly enough for people to be tempted to use it to balance their bank account."

Instant Easel

The final package in the suite is the business graphics package, *Easel*. While the combination of a database, wordprocessor and spreadsheet has long been the established formula for a business system, the addition to the trio of a graphics package is something relatively new. I asked *Martin Brown*, author of *Easel*, what the product offers that other graphics packages don't.

"Most business graphics packages are 'post-processing' programs. That is, they take data from, say, a database and turn it into a set form of graph or table – and that's it. We wanted to go for a genuinely interactive approach. With *Easel*, you can sit down in front of it, type in a few figures and instantly see those figures displayed as a bar-chart. If you want to turn the chart on its side, you can. If you want a graph instead or as well, you can do that too.

"To start with, everything is set by defaults. You won't be asked a lot of questions first, you just get the default display. Later, you can change anything you don't like – colours, type of grid, form of chart or graph, and so on."

But how useful is the ability to produce graphs from keyboard data? I put it to Brown: wouldn't most users be importing data from a spreadsheet or database?

"I think it's useful in cases where the user has only a small amount of data to work on," he replied. "You don't want to go to all the trouble of setting up a spreadsheet model, exporting the file to *Easel*, and then loading *Easel* before you can produce your graph. *Easel* has simple spread sheet functions built-in which allow you to combine different sets of data. Mathematical functions are also incorporated, enabling you to produce sine waves and so on."

And what of the future? Will we be seeing the four QL packages on other machines? "Yes," says Psion. "We're working on other machines right now." Marketing manager Matthew Gaved wouldn't specify which, but I'd say it was a safe bet that we'll have CP/M and MS-DOS versions before long. I'll also give good odds on the BBC micro as another likely candidate.

And how about QL games software? "We're working on that too," says Gaved, "but we're not saying what."

This article also appears in QL User: The Complete Dossier

ALL CHANGE!

Ever wanted to rename a Microdrive file? Providing the code to create the necessary new command,* Andrew Pennell *brings Microdrives one step nearer the expensive disk systems they emulate.

Although Sinclair Research's Interface 1 unit allows good use of the Microdrives from Basic, there is one command noticeable only by its absense — that of RENAME. It's provided by most disk operating systems and associated Basics, but not for the dear old Speccy. Here, therefore, is the machine code you've been waiting for — although, I'm afraid that it's for 48K owners only.

Listing 1 shows the Basic loader to create the machine code; enter it with great care — the checksum should spot most typing errors, but some may slip through. After entering and executing, SAVE the program in case it's wrong. To test it, enter RANDOMIZE USR 28000, which enables it. Then, with an unimportant cartridge, try to rename a file; the syntax to use is

```
*R1;"oldname" TO "newname"
```

where 'TO' is the keyword (and 'r' is also accepted). Naturally, '1' in the example can be replaced with any drive number, up to '8' (should you be lucky enough to have that many!). Having entered the command, the file 'oldname' will be renamed to 'newname', although there are a couple of limitations. Firstly, data files (that is, those created with OPEN/PRINT/CLOSE) will *not* be renamed, and will produce the error 'Wrong file type'. A second limitation is that the file 'oldname' must be under about 37K in length — otherwise it'll be flagged 'Out of memory'.

The program has been written so that if any error occurs during the process (except perhaps a power cut!) then the file will remain intact, under one of the names. If you try to rename a non-existant file, you'll come across the 'File not found' message, and an attempt to define a new name that's already present on the cartridge will force 'Writing to a read file.'.

The source code is shown in Listing 2, and uses the facility of the Interface 1 to add commands to the Basic interpreter. The remainder of this explanation assumes a basic knowledge of machine code with the Microdrives, and of how to add commands; for this I suggest you read chapters eight and nine respectively of *Master your ZX Microdrive* — and Toni Baker's *Extending Basic* article (see issue 3).

The code is placed at 28000 decimal, to give some room for small Basic programs, and over 37K to store the file. The routine SETUP is the one entered directly from Basic, and the first creates the Interface system variables, using

```
  10 REM    MICRODRIVE RENAME
  20 REM (C) A. Pennell 1984
  30 REM
 100 RESTORE 1000: CLEAR 27999
 105 LET s=0
 110 FOR i=28000 TO 28254
 120 READ a: POKE i,a: LET s=s+
a
 130 NEXT i
 140 IF s<>27057 THEN PRINT "Da
ta error": STOP
 150 PRINT "Data OK. Code start
s @28000, 255long."
1000 DATA 207,49,33,188,109,34
1010 DATA 183,92,33,116,109,34
1020 DATA 237,92,207,50,1,0,0
1030 DATA 201,33,145,109,58,218
1040 DATA 22,254,255,40,3,33
1050 DATA 165,109,6,5,94,35,86
1060 DATA 35,126,18,35,126,19
1070 DATA 18,35,16,243,201,238
1080 DATA 109,41,27,47,110,172
1090 DATA 21,50,110,169,18,73
1100 DATA 110,238,20,79,110,110
1110 DATA 29,238,109,5,27,47
1120 DATA 110,157,25,50,110,142
1130 DATA 19,73,110,223,24,79
1140 DATA 110,121,29,195,40,0
1150 DATA 198,206,254,42,194
1160 DATA 240,1,215,32,0,246
1170 DATA 32,254,114,32,237,215
1180 DATA 32,0,205,30,6,254,59
1190 DATA 32,227,205,47,6,254
1200 DATA 204,32,220,205,84,110
1210 DATA 205,47,6,205,183,5
1220 DATA 205,84,110,42,220,92
1230 DATA 229,205,5,27,225,34
1240 DATA 220,92,221,203,24,70
1250 DATA 40,2,231,17,219,239
1260 DATA 230,1,32,2,231,14,221
1270 DATA 203,67,86,32,2,231
1280 DATA 22,221,229,225,17,82
1290 DATA 0,25,17,99,110,1,9
1300 DATA 0,237,176,237,83,233
1310 DATA 92,33,108,110,237,91
1320 DATA 100,110,25,48,5,253
1330 DATA 54,0,3,239,205,157
1340 DATA 25,205,142,19,33,99
1350 DATA 110,17,230,92,1,9,0
1360 DATA 237,176,205,84,110
1370 DATA 33,108,110,34,228,92
1380 DATA 205,223,24,205,84,110
1390 DATA 205,121,29,195,193
1400 DATA 5,33,218,92,17,95,110
1410 DATA 6,4,195,167,5
```

Listing 1 (above): The Basic loader to create the RENAME machine code.
Listing 2 (below): The disassembled listing, roughly split into five columns: address, Hex code, line numbers (unique to the disassembler used), labels and mnemonics.

```
                 10 ; MICRODRIVE RENAME
                 20 ; (C) A.PENNELL 1984
                 30 ;
6D60           1000        ORG  28000
6D60 CF        1010 SETUP  RST  8
6D61 31        1020        DEFB #31 ;make vars
6D62 21BC6D    1030        LD   HL,NEWSYN
6D65 22B75C    1040        LD   (VECTOR),HL ;change VECTOR
6D68 21746D    1050        LD   HL,WATROM
6D6B 22ED5C    1060        LD   (HD_11),HL
6D6E CF        1070        RST  8
6D6F 32        1080        DEFB #32 ;call WATROM to modify CALLs
6D70 010000    1090        LD   BC,0
6D73 C9        1100        RET
               1110 ; modify routine for different ROMs
6D74 21916D    1120 WATROM LD   HL,OLDROM
6D77 3ADA16    1130        LD   A,(#16DA)
6D7A FEFF      1140        CP   #FF
6D7C 2803      1150        JR   Z,YESOLD
6D7E 21A56D    1160        LD   HL,NEWROM ;to suit new ROM
6D81 0605      1170 YESOLD LD   B,5 ;no of CALLs to alter
6D83 5E        1180 REDOLP LD   E,(HL)
6D84 23        1190        INC  HL
6D85 56        1200        LD   D,(HL) ;DE=CALL+1
6D86 23        1210        INC  HL
6D87 7E        1220        LD   A,(HL)
6D88 12        1230        LD   (DE),A
6D89 23        1240        INC  HL
6D8A 7E        1250        LD   A,(HL)
6D8B 13        1260        INC  DE
6D8C 12        1270        LD   (DE),A ;alter CALL
6D8D 23        1280        INC  HL
6D8E 10F3      1290        DJNZ REDOLP
6D90 C9        1300        RET
               1309 ; data table for old ROM
6D91 EE6D291B  1310 OLDROM DEFW L1+1,#1B29 ;OPEN_M
6D95 2F6EAC15  1320        DEFW L2+1,#15AC ;LDBYTS
6D99 326EA912  1330        DEFW L3+1,#12A9 ;CLOSEM
6D9D 496EEE14  1340        DEFW L4+1,#14EE ;SVBYTS
6DA1 4F6E6E1D  1350        DEFW L5+1,#1D6E ;ERASEM
               1359 ; data table for new ROM
6DA5 EE6D051B  1360 NEWROM DEFW L1+1,#1B05 ;OPEN_M
6DA9 2F6E9D19  1370        DEFW L2+1,#199D ;LDBYTS
6DAD 326EBE13  1380        DEFW L3+1,#13BE ;CLOSEM
6DB1 496EDF18  1390        DEFW L4+1,#18DF ;SVBYTS
```

hook code #31, then alters VECTOR to point to the new command routine. It then calls WATROM using hook code #32, before RETurning to Basic. The routine WATROM actually modifies the program to suit the ROM in the Interface 1. As you may be aware, Interface 1 will shortly be sporting a new ROM which has most of its routines in different places. To cater for this, the tables OLDROM and NEWROM allow the program to modify itself to suit either, using location #16DA to test the ROM's type. It had to be called indirectly via hook code #32 because the Shadow ROM must be in place for it to work.

Location SYNERR is just a jump to #28 in the Shadow ROM which produces a syntax error when in the line editor. NEWSYN is the new command handler, which first ensures that the command starts with *R or *r. That done, the drive number is scanned, a semi-colon checked for, then the old filename scanned. Next, the character following it (that is, the TO token) is checked, then the routine SWOP called. This is explained later, and only has significance during 'run-time'.

The new name is scanned, and a check made to ensure that there's no more to the statement. Control only passes to line 2200 during 'run-time', which again calls SWOP. This routine swaps the parameters (start address and length) for the old and new names, which are stored in N-STR1, T-STR1 and N-STR3, T-STR3. The Shadow ROM routines act on the parameters in the former two.

The next action taken is for OPEN-M to be called, while preserving T-STR1. As the Shadow ROM is in place, hook codes cannot be used, so routines vary according to ROM type. OPEN-M takes identical action to hook code #22 — that is, create an 'M' channel addressed by IX. The old file is then checked to see if it exists, whether it's a PRINT file, and whether the cartridge is write-protected or not. If it passes all the criterion the nine-byte file header is copied to FREE, and the length of the file is tested to see if there's room for it and if not an error is produced. The shadow routine LDBYTS is called which loads the rest of the file into locations FREE+9 onwards, and then the channel is closed.

Next, the header is copied back from FREE to HD-00 to HD-11, and the bytes SAVEd on to the required cartridge. Routine SVBYTS does a lot of the fiddly bits for you, like opening an 'M' channel, setting the PRINT file flag and testing to see if it's already there. Finally, the old file is erased — by calling ERASEM — and an exit made via #05C1 (which is the same in both ROMs, thankfully). YS

```
6DB5 4F6E791D  1400         DEFW L5+1,#1D79 ;ERASEM
6DB9 C32800    2000 SYNERR JP   #28 ;syntax error
               2005 ; new command routine
6DBC C6CE      2010 NEWSYN ADD  A,206
6DBE FE2A      2020         CP   "*"
6DC0 C2F001    2030         JP   NZ,#01F0 ;check "*"
6DC3 D7        2040         RST  #10
6DC4 2000      2050         DEFW #20 ;next-char
6DC6 F620      2060         OR   #20 ;make it lower case
6DC8 FE72      2070         CP   "r"
6DCA 20ED      2080         JR   NZ,SYNERR
6DCC D7        2090         RST  #10
6DCD 2000      2100         DEFW #20
6DCF CD1E06    2110         CALL #061E ;do drive no
6DD2 FE3B      2120         CP   ";"
6DD4 20E3      2130         JR   NZ,SYNERR
6DD6 CD2F06    2140         CALL #062F ;do old name
6DD9 FECC      2150         CP   204 ;"TO"
6DDB 20DC      2160         JR   NZ,SYNERR
6DDD CD546E    2170         CALL SWOP
6DE0 CD2F06    2180         CALL #062F ;do new name
6DE3 CDB705    2190         CALL #05B7 ;check end
6DE6 CD546E    2200         CALL SWOP
6DE9 2ADC5C    2210         LD   HL,(T_STR1)
6DEC E5        2220         PUSH HL ;save start on stack
6DED CD051B    2250 L1      CALL OPEN_M
6DF0 E1        2255         POP  HL
6DF1 22DC5C    2260         LD   (T_STR1),HL ;restore start
6DF4 DDCB1846  2265         BIT  0,(IX+24)
6DF8 2802      2270         JR   Z,FOUND
6DFA E7        2280         RST  #20
6DFB 11        2290         DEFB #11 ;"File not found"
6DFC DBEF      2300 FOUND   IN   A,(#EF)
6DFE E601      2310         AND  1
6E00 2002      2320         JR   NZ,NPROT
6E02 E7        2330         RST  #20
6E03 0E        2340         DEFB #0E ;"Write protected"
6E04 DDCB4356  2350 NPROT   BIT  2,(IX+67)
6E08 2002      2360         JR   NZ,NPRINT
6E0A E7        2370         RST  #20
6E0B 16        2380         DEFB #16 ;"Wrong file type"
6E0C DDE5      2390 NPRINT  PUSH IX
6E0E E1        2400         POP  HL
6E0F 115200    2410         LD   DE,82
6E12 19        2420         ADD  HL,DE ;=1st byte in header
6E13 11636E    2430         LD   DE,FREE
6E16 010900    2440         LD   BC,9
6E19 EDB0      2450         LDIR ;copy header to FREE
6E1B ED53E95C  2460         LD   (HD_0D),DE ;start=FREE+9
6E1F 216C6E    2461         LD   HL,FREE+9
6E22 ED5B646E  2462         LD   DE,(FREE+1) ;=file length
6E26 19        2463         ADD  HL,DE
6E27 3005      2464         JR   NC,L2 ;if it will fit
6E29 FD360003  2465         LD   (IY+0),3 ;"Out of memory"
6E2D EF        2466         RST  #28 ;do BASIC rom error
6E2E CD9D19    2470 L2      CALL LDBYTS ;load the file
6E31 CD8E13    2480 L3      CALL CLOSEM ;close the channel
6E34 21636E    2490         LD   HL,FREE
6E37 11E65C    2500         LD   DE,HD_00
6E3A 010900    2510         LD   BC,9
6E3D EDB0      2520         LDIR ;copy header to HD_00 etc
6E3F CD546E    2530         CALL SWOP
6E42 216C6E    2570         LD   HL,FREE+9
6E45 22E45C    2580         LD   (#5CE4),HL ;new start
6E48 CDDF18    2590 L4      CALL SVBYTS ;save data & close channel
6E4B CD546E    2600         CALL SWOP
6E4E CD791D    2610 L5      CALL ERASEM ;erase old file
6E51 C3C105    2620         JP   #05C1 ;then exit
               2700 ;
               2710 ; Swop contents of N_STR1 & T_STR1 with 3
6E54 21DA5C    2720 SWOP    LD   HL,N_STR1
6E57 115F6E    2730         LD   DE,N_STR3
6E5A 0604      2740         LD   B,4
6E5C C3A705    2750         JP   #05A7
6E5F 0000      9000 N_STR3 DEFW 0
6E61 0000      9010 T_STR3 DEFW 0
6E63 00        9020 FREE    NOP
              10000 ; CONSTANTS
5CB7          10010 VECTOR EQU  #5CB7
5CDA          10020 N_STR1 EQU  #5CDA
5CDC          10030 T_STR1 EQU  #5CDC
5CE2          10040 N_STR2 EQU  #5CE2
5CE4          10050 T_STR2 EQU  #5CE4
5CE6          10060 HD_00  EQU  #5CE6
5CE7          10065 HD_0B  EQU  #5CE7
5CE9          10070 HD_0D  EQU  #5CE9
5CED          10080 HD_11  EQU  #5CED
              12000 ; (NEW) SHADOW ROM ROUTINES
1D79          12080 ERASEM EQU  #1D79
1B05          12090 OPEN_M EQU  #1B05
199D          12100 LDBYTS EQU  #199D
18DF          12110 SVBYTS EQU  #18DF
138E          12120 CLOSEM EQU  #138E
6E64          12130         END
```

GRAPHIC DEFINITIONS

Defining graphics on paper can be an arduous task — especially when the finished item on-screen looks nothing like you imagined it.* Toni Baker's *got a much better idea . . . and she's backed it up with machine code to boot!

User-defined graphics are those things which appear on your screen when you press a letter of the alphabet while the cursor says 'G'. By suitable POKEing you can make any graphics look more or less like anything you want; for instance, graphic A could be a Peace symbol, graphic B could be a flower, and so on.

But after a while you find that all this messing around with BIN and scraps of squared papers gets bit tedious, and you start to think how nice it would be to have a simple, foolproof way of defining any graphics character. That means having a powerful editing tool with a moveable cursor that will allow you to set and reset any pixel and see the results immediately, both magnified (so you can see the eight-by-eight layout explicitly), and 'life-size' (so you can see it as it really is).

So, rather than pay ludicrous sums of money for someone else's graphics designing program, I decided to write my own. (As usual, I'm going to give it away to all you lucky people . . . there's a lesson to be learnt there somewhere, but I'd rather not look for it!)

QUICK ON THE DRAW

This is what happens when you run my program. In the top left-hand corner of the screen you get a larger than life picture of what the said graphic will look like. This image is eight squares across and eight squares tall with, of course, one square for each pixel of the finished graphic. Each square is either PAPER coloured (with an INK coloured border) or INK coloured (with a PAPER coloured border). In addition, you get a little dot in the middle of one of the squares, representing a cursor. You can move this cursor all over the place with the aid of the cursor controls, so if you make a mistake it's dead easy to go back and change it.

In the middle of the screen you get a message saying 'GRAPHIC TO DEFINE A ="A" '. The letter won't always be 'A', of course — it depends on which graphic you're defining. The symbol in the quotes is the finished graphic, and is updated continuously as the graphic is changed. Below that you get a complete set of all the user-defined graphics, to let you see exactly what's what.

```
DEFB 16 0C 00 47 52 41 50 48 49 43 20 54 4F 20 44 45
DEFB 46 49 4E 45 20 41 3D 22 90 22 0D 0D 41 42 43 44
DEFB 45 46 47 48 49 4A 4B 4C 4D 4E 4F 50 51 52 53 54
DEFB 55 0D 90 91 92 93 94 95 96 97 98 99 9A 9B 9C 9D
DEFB 9E 9F A0 A1 A2 A3 A4
```

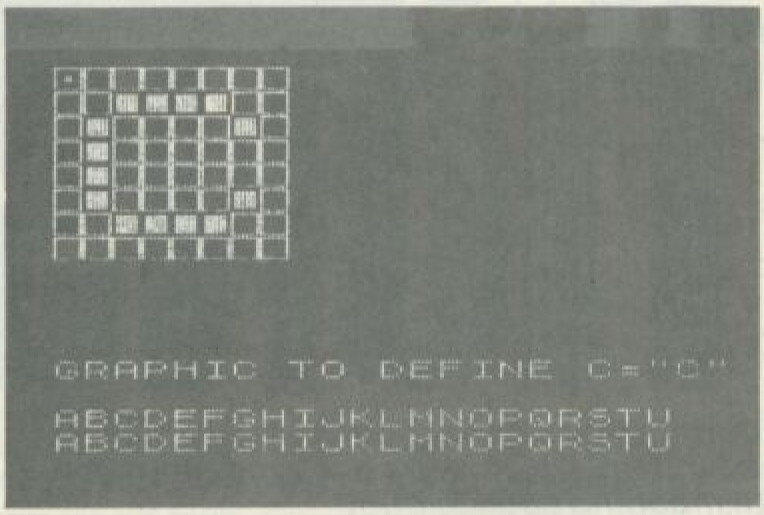
This block of Hex is similar to Basic's Data statements; it holds information necessary for displaying information on the screen. The code should be organised at 8000h.

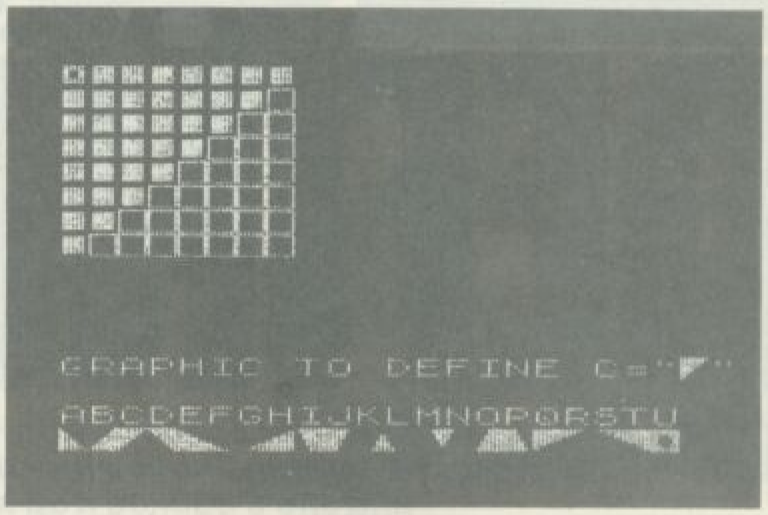
CODE		ASSEMBLER	COMMENTS
3A1580	FIND_UDG	LD A, (UDG_LETTER)	A:= the charactor code of an upper case letter name of a graphics character.
3D	FIND_UDG_2	DEC A	
87		ADD A,A	
87		ADD A,A	
87		ADD A,A	Multiply by eight.
5F 0		LD E,A	
1600		LD D,00	
2A7B5C		LD HL, (UDG)	Point HL to graphic A.
19		ADD HL,DE	Point HL to the required graphic.
C9		RET	

Above: This is a subroutine used by the main machine code program — when you get there you should be at 8047h. Below: This is the start of the machine code proper. To run the program, you need to call address 8056h.

210000	START	LD HL,0000	
FD7402		LD (TVFLAG),H	Print to the lower part of the screen.
22B05C		LD (XY_COORDS),HL	Reset the graphics cursor.
CD4780	RESTART	CALL FIND_UDG	HL:= the address of the graphics character.
E5		PUSH HL	Stack:= the address of the graphics character.
210040		LD HL,D_FILE	HL:= points to AT 0,0; position.
0E08		LD C,08	
E3	LOOP_I	EX (SP),HL	
7E		LD A,(HL)	A:= the next pixel row.
23		INC HL	Point to the next pixel row.
E3		EX (SP),HL	
0608		LD B,08	
17	LOOP_J	RLA	
F5		PUSH AF	Stack pixel information.
9F		SBC A,A	A:= 00 if pixel reset, FF if set.
2F		CPL	A:= FF if pixel reset, 00 if reset.
77		LD (HL),A	Print onto the screen.
24		INC H	Point to the next row on the screen.
EE7E		XOR 7E	A:= 81 if pixel set, 7E if reset.
1606		LD D,06	
77	LOOP_K	LD (HL),A	Print onto the screen.
24		INC H	Point to the next row on the screen.
15		DEC D	
20FB		JR NZ,LOOP_K	Fill in the body of the character.
EE7E		XOR 7E	A:= FF if pixel set, 00 if reset.
77		LD (HL),A	Print onto the screen.
F1		POP AF	A:= pixel information.
1101F9		LD DE,F901	
19		ADD HL,DE	Point to the next character square.
10E7		DJNZ LOOP_J	Repeat for eight pixels.
111800		LD DE,0018	

BEFORE ...   ... AND AFTER





Once you've got the code up and running, you'll be presented with a screen like that shown above. To begin defining your own graphics, simply press the key of the letter you wish to define; in the first illustration above, the 'C' key is undergoing transformation. Using the cursor keys, you can move the flashing dot (see the top left-hand pixel of the character square) and set and reset the individual cells to form the shape you require. Once you've displayed your graphics alphabet, this will be displayed at the bottom of the screen so that you can identify them easily.

Once the program is running there are a number of things you can do.

1. Press a letter key (without Shift); for example, if you want to define graphic J then press the 'J' key, if you want to define graphic Q then press the 'Q' key, and so on.
2. Press a cursor key. This will move the cursor left, right, up or down as you'd expect. If you press Caps Shift at the same time then the pixel at the cursor position will be 'set', if you press Symbol Shift at the same time then the said pixel will be 'reset'. Without Shift, of course, everything stays unchanged.
3. Press any other number key, Space, or Enter (without Shift). This will have no effect whatsoever and will be a complete waste of time.
4. Press Symbol Shift and the '1' key. This will completely blank the character, *resetting* every pixel.
5. Press Caps Shift and the '1' key. This will completely fill in the character, *setting* every pixel.
6. Stop for a bit and put the kettle on.
7. Press *either* Shift key and the '4' key. This will invert the character, so that every pixel which was set becomes reset, and *vice versa*.
8. Press *either* Shift key and the '0' key. This will break out of the program and return you to normal Basic.
9. Press Symbol Shift and any number key other than a cursor key (or Space or Enter). This will *reset* one pixel without moving the cursor.
10. If the kettle has boiled, make the tea.
11. Press Caps Shift and any number key other than a cursor key (or Space

GRAPHIC DEFINITIONS

19		ADD HL,DE	Point to the next line of squares.
0D		DEC C	
20DA		JR NZ,LOOP_I	Repeat for each row of pixels.
E1		POP HL	Balance the stack.
3AB05C		LD A,(Y_COORD)	A:= Y co-ordinate of the graphics cursor.
0F		RLCA	
0F		RLCA	
0F		RLCA	
FDB677		OR (X_COORD)	A:= 8*Y+X co-ordinates.
6F		LD L,A	
2643		LD H,43	Point HL to the appropriate point on the screen.
7E		LD A,(HL)	A:= 18 or 7E accordingly.
EE18		XOR 18	A:= 99 or 66 to mark the cursor.
77		LD (HL),A	Mark the cursor on the screen.
24		INC H	Point to the next row on the screen.
77		LD (HL),A	Mark the cursor on the screen.
014700		LD BC,0047	BC:= the length of the message.
110080		LD DE,8000	DE: points to start of message.
CD3C20		CALL 203C	Print the message on the screen.
FDCB016E	WAIT	BIT 5, (FLAGS)	
28FA		JR Z,WAIT	Wait until a key is pressed.
FDCB01AE		RES 5,(FLAGS)	Signal ready for the next key.
CD8E02		CALL KEY_SCAN	A:= the character code of a digit or capital letter on the key pressed (or 0D, 0E or 20 for Enter, both Shift keys or Space, respectively.
3A045C		LD A,(KSTATE_4)	D:= the Shift key status.
FE40		CP40	
14		INC D	
381D		JR C, NOT_LETTER	Jump unless a letter was pressed.
2810		JR Z,CHANGE_UDG	Jump if no Shift keys pressed.
CD4A80		CALL FIND_UDG_2	HL:= the address of the UDG for the key pressed.
E5		PUSH HL	
CD4780		CALL FIND_UDG	HL:= the address of the UDG specified.
D1		POP DE	DE:= the address of the UDG for the key pressed.
EB		EX DE, HL	
010800		LD BC,0008	
EDB0		LDIR	Copy the UDG.
1808		JR EXIT_1	Jump to exit.
321580	CHANGE_UDG	LD (UDG_LETTER),A	Change the current UDG name.
C64F		ADD A,4F	A:= the UDG character.
321880		LD (UDG_CHR),A	Insert into the message . . .
C35680	EXIT_1	JP START	And start all over again.
284C	NOT_LETTER	JR Z,NO_SHIFT	Jump only if no Shift keys were pressed.
FE30		CP "0"	
C8		RET Z	Exit the program if Shift and the '0' key were pressed.
FE31		CP "1"	

2016		JR NZ,TEST_4	Jump unless Shift and the '1' key were pressed.
7A		LD A,D	
FE19		CP 19	
2804		JR Z,RESET_UDG	Jump if Symbol Shift and the '1' key were pressed.
0EFF	SET_UDG	LD C,FF	Set all the pixels of C.
1802		JR BLANK_UDG	
0E00	RESET_UDG	LD C,00	Reset all the pixels of C.
CD4780	BLANK_UDG	CALL FIND_UDG	HL:= address of UDG specified.
0608		LD B,08	
71	BL_LOOP	LD (HL),C	
23		INC HL	
10FC		DJNZ BL_LOOP	Blank the entire UDG.
186B		JR EXIT_2	Jump to exit.
FE34	TEST_4	CP "4"	
200D		JR NZ,NEW_PIX	Jump unless Shift and '4' pressed.
CD4780		CALL FIND_UDG	HL:= address of UDG specified.
0608		LD B,08	
7E	INV_LOOP	LD A,(HL)	A:= the next row of pixels.
2F		CPL	Change to inverse video.
77		LD (HL),A	Invert the row.
23		INC HL	Point to the next row.
10FA		DJNZ INV_LOOP	Invert the whole character.
185A		JR EXIT_2	Jump to exit.
F5	NEW_PIX	PUSH AF	Push the character code.
7A		LD A,D	
FE20		CP 20	
9F		SBC A,A	A:= 00 if Caps Shift was pressed, FF otherwise.
E608		AND 08	A:= 00 or 08.
EEDF		XOR DF	A:= DF or D7.
FDAE77		XOR (X_COORD)	
07		RLCA	
07		RLCA	
07		RLCA	
322C81		LD (CHEAT),A	Specify the appropriate set or reset instruction.
CD4780		CALL FIND_UDG	HL:= address of UDG specified.
FD4E76		LD C, (Y_COORD)	
0600		LD B,00	
09		ADD HL,BC	Point HL to the row containing the pixel at the cursor position.
CB00		DEFB CB 00	Set or reset the instruction as specified by the program.
	CHEAT	$-1	
F1		POP AF	A:= the character code of the key pressed.
FE35	NO_SHIFT	CP "5"	
2818		JR Z,LEFT	Jump if 'cursor left'.
FE36		CP "6"	
282A		JR Z,DOWN	Jump if 'cursor down'.
FE37		CP 37	
281B		JR Z,UP	Jump if 'cursor up'.
FE38		CP "8"	
202C		JR NZ,EXIT_2	And exit unless 'cursor right'.
3AB15C	RIGHT	LD A, (X_COORD)	
FE07		CP 07	
2825		JR Z,EXIT_2	
FD3477		INC (X_COORD)	Move cursor right.
1820		JR EXIT_2	
3AB15C	LEFT	LD A, (X_COORD)	
A7		AND A	
281A		JR Z,EXIT_2	
FD3577		DEC (X_COORD)	Move cursor left.
1815		JR EXIT_2	
3AB05C	UP	LD A, (Y_COORD)	
A7		AND A	
280F		JR Z,EXIT_2	
FD3576		DEC (Y_COORD)	Move cursor up.
180A		JR EXIT_2	
3AB05C	DOWN	LD A, (Y_COORD)	
FE07		CP 07	
2803		JR Z,EXIT_2	
FD3476		INC (Y_COORD)	
C35F80	EXIT_2	JP RESTART	

or Enter). This will *set* one pixel without moving the cursor.

12. Press either of the Shift keys together with any letter key. This will re-define the said graphic as an exact copy of the graphics character for the letter key you've just pressed (which is slightly useful).

13. Drink the tea. (*I don't mind if I do. Ed.*)

As you can see, it does quite a good job, and tries its humble best to make life really easy for the budding graphic designer. I've found that one of the most useful ways of using the machine code is to SAVE it under some name ('Gr MC'. say), and then to have a Basic program like this:

```
10 LOAD "Gr MC" CODE
20 RANDOMIZE USR 32854
30 INPUT "Name of program"; A$
40 LOAD A$
```

You can always SAVE the Basic bit with a sensible name like 'Graphics', of course. This way, if you use SAVE "Graphics" LINE 10, then whenever you LOAD it you'll have your graphics designing set-up on the screen waiting for you. What's more, when you break out (using Shift and the '0' key) you'll be asked to name the Basic program with which you want to use the graphics you've just invented. (If you want to invent a new program at this point, then just break out using EDIT/STOP/ Enter.) All this will of course be just as true for people with Microdrives, except that instead of LOAD you have to put LOAD *"m";1; (awkward isn't it?) and likewise for SAVE.

The program is designed to sit at address 8000 Hex, which means that anyone who's only got the 16K Speccy will have to mess around trying to stick it somewhere else. The best way to do this is to change every address beginning '80' to a similar address with a different low byte, and every address beginning '81' to something else. For SAVE-ing purposes, you may like to know that the program takes up 361 (decimal) bytes, and that 8000 (Hex) is 32768 (decimal).

WHO'S A CHEAT?

An interesting bit of program to watch out for is the stuff just above the label 'CHEAT'; that's where the program works out which machine code instruction it wants to execute and then POKEs it into the program before executing it. Thus, the program is self-modifying. There are two schools of thought regarding this sort of practice — the majority, who think it's cheating and thus shouldn't be allowed, and a minority of programmers who think it's actually quite clever. As you will have gathered I (without shame) subscribe to the second viewpoint; anyone now reaching for a pen to write that 'encouraging bad programming practice' letter should note that I've seen it all before.

Well, that's it, barring the code itself. Remember, to run it you must call the code from address 8056 Hex. YS

TALKING OF TOOLKITS

Essential for software development, toolkits are often billed as the programmer's 'tools of the trade'.* Peter Freebrey *takes five such packages on the bench and examines whether they fulfill their promise.

A toolkit is a utility program that will take a lot of the sweat and worry out of writing and debugging your own programs; often too, it will give commands and routines the computer manufacturer should have installed in the ROM in the first place! These are likely to include: Renumber, Delete, Free Memory, Find, List Variables and Alter. You may find one or two are missing, but in that case, there'll probably be instead some other useful goodies tucked away in that binary brainbox. And, as you'll see from the table included in this article, some toolkits have a larger range of commands than others. But, much like computers in general, put a number of them side-by-side and you'll be able to say that each should ideally have something that one of the others has got. That's life, I guess!

So, what are these routines for? Well, say for instance that you've written a long program without keeping an absolute record of the variable names you have used (tsk, tsk). In that case, FIND DX (for instance) will jump to the rescue and list out the lines where you used the variable DX. No can find? Great... in that case you can use it as your next variable.

Have you ever kept rigidly to a line spacing of 10 — 10, 20, 30, 40 ... — only to find that you need to insert some lines between lines 110 and 120? Well, no problem if there are just a few of them — 111, 112, 113, etc. But what if you need to insert a routine of 20 or so lines? Yes, of course you can change the line numbers, but at this stage it's all too easy to overwrite an existing line and... whoops, another chunk of debugging to deal with. RENUMBER is the simple and safe (usually!) way out.

Then again, perhaps you have a *big* program and you want to know how much memory you've got left. You can remember reading in that book you bought last Saturday about some POKEs and PEEKs that will tell you but, now where was that page? In fact, it's much easier to just type FREE (or some such) and see the answer immediately. All these are often used applications of the ubiquitous toolkit.

If you're in the market for a toolkit (or I've just convinced you that you should be!), you probably won't be surprised to find out that there are a number of toolkits for the Spectrum, and two of the five reviewed here are readily available over the counter in two of the larger chain stores. The other three can be ordered through the post if you're unable to find them in good shops.

The table at the end lists the routines available from each toolkit and provides a quick comparison of what each offers. But this is by no means the whole story, for ease of use is an important factor too. One toolkit from a year or so back required something like 'RANDOMISE USER 63338 a,b,c,d' to be typed in each time you wanted a specific routine; certainly it provided the goods, but it was also a case of getting the instructions out every time you wanted to use it! Then there's the matter of 'friendliness' of operation... is it possible to irrevocably change (or ruin) your program by just a simple mis-key? Sometimes to get the set of routines you want, you have to accept a compromise. I'll be dealing with each toolkit individually, pointing out not only its better points but the rough edges as well.

Do you want ease of use? Do you use a lot of user-defined graphics? Do you write long, long programs?

As usual, the final decision has to be tempered by the specific needs of the prospective user. So, research your requirements and check 'em all out.

TOOLKIT COMPARISON

	STAR DREAMS TOOL KIT	NECTARINE SUPER TOOLKIT	DK'TRONICS ZXED	OCP MASTER TOOL KIT	TIMEDATA TT-S
PRICE	£4.95	£6.95	£6.95	£9.95	£7.95
MEMORY LEFT FOR PROGRAM	38291	39047	39339 37372	34152	37177
RENUMBER	•	•	•	•	•
AUTO LINE			•		•
FIND	•		•	•	•
ALTER	•	•	•	•	
DELETE LINES	•	•	•	•	•
MOVE LINES	•		•	•	•
COPY LINES			•	•	
LIST VARIABLES	•	ouch!		•	•
TRACE	•	•		•	•
LINE ADDRESS			•		
MERGE LINES	•			•	
APPEND TO LINE			•		
CASE CHANGE	•			•	
LINE RANGE	start			full	start
FREE MEMORY	•	•	•	•	•
REM KILL	•	•		•	
CRUNCH — PACK				•	
PROGRAM LENGTH	•	•			•
HEX DUMP	•				
MEMORY MAP	•	•		•	
DISPLAY UDGS	•				•
CLOCK				•	
ALARM				•	
SYNTAX CHECK				•	
DIRECT OUTPUT	•			•	
FUNCTION KEYS				•	
SET ERROR TRAP				•	
SET BREAK TRAP				•	
READ TAPE HEADER		•			•
HI-RES DRAW					•
MEMORY TEST					•
UDG — CREATOR					•

Continued on page 65

Your Spectrum, **in association with the management of the London Hippodrome, is deliriously happy to announce . . .**

THE GREAT ANIMATED LOGO COMPETITION

THE PLACE

Halfway along London's Charing Cross Road there's a nightclub called, enchantingly, the Hippodrome. On the site of the old 'Talk of the Town', it's definitely one of London's most popular nightclubs and claims to be the world's greatest disco.

If that's true, the last thing you might expect to see would be a ZX Speccy. Not so, the Hippodrome not only has one, it uses one. DJ Laurie Black brought it in one evening and it hasn't been home since. It's now used to display messages on a huge video screen so that they don't interrupt the music.



The irrepressible Peter Stringfellow gives pride of place to the Speccy at the control centre of the London Hippodrome

Peter Stringfellow is the bubbly owner/manager and he opened the 'Hippo' on November 17th 1983, at a cost of £3.4 m, to follow the success of his other nightclub, Stringfellows. He's been planning this club since the early seventies and has since spent a further £1 million on lights and lasers alone. Even so, the Hippodrome isn't finished yet and, according to Peter Tyler, the Effects Manager, it never will be!

The Hippodrome regularly has an attendance of around 2,000 guests each evening and is open to the public from Monday to Saturday.

THE COMPO

What we want you to do is create an animated sequence using the Hippodrome's logo on your Speccy. Make it fit into 48K and send it off to *YS* along with a reliable cassette (preferably recorded twice) and the completed entry form. The closing date is the 15th September 1984, so start tapping at the keyboard ASAP. Don't forget, the winning entry will be used in the Hippodrome disco constantly!



THE INCENTIVE

First prize is full membership to the Hippodrome for 12 months; plus a weekend wallow at the Waldorf Hotel for two, visiting the Hippodrome on the Saturday night for a champagne dinner and the first public showing of your winning entry.

Not only that! The ten runners-up to the competition will get a full 12 months subscription to *Your Spectrum*.

Mail your works of art to: *Logo Competition, Your Spectrum, 14 Rathbone Place, London W1P 1DE.*
I enclose my entry to the *Hippodrome/Your Spectrum* competition. Please give it your utmost attention and most careful consideration as it took me ages to do it.

Name..

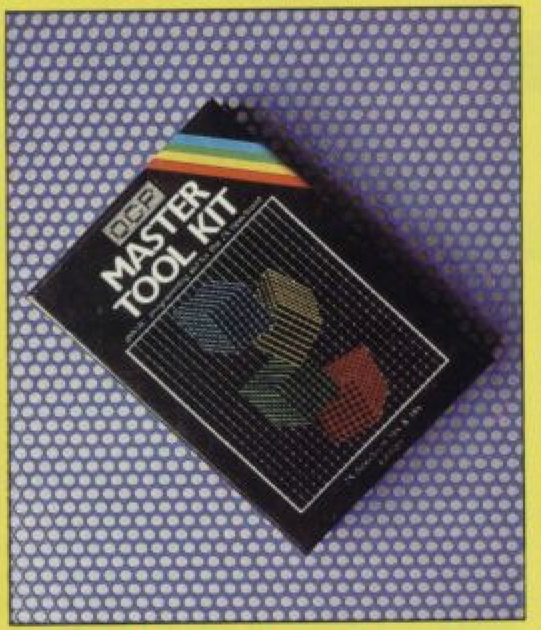
Address..

....

.... **Postcode** ....

Daytime telephone number..

Please enclose a stamped and addressed envelope if you would like your cassette to be returned



IAN McKINNELL

OCP MASTER TOOLKIT

This product also uses an interrupt mode and in so doing introduces two new routines to the expected toolkit range: CLOCK and ALARM. Although I doubt that these will shake the programming world, we all know how easily time flies when deep into the latest keyboard creation. The line-up of routines in *Master Tool Kit* (*MTK*) is fairly extensive and easy to use. It has programs for either 16K or 48K machines, one each side of the cassette. LOADing is carried out with LOAD " ", and to invoke the toolkit press Symbol Shift and Space at the same time. This will clear the screen, and now the routines may be called by pressing a single key followed by Enter. *MTK* will remain active *until* you key 'B' (return to Basic). The only criticism I have of the system is that the 'R' key is used for (surprise, surprise...) RENUMBER; 'R' is also Spectrum's RUN key and should you forget — in a moment of weakness — that you've not returned to Basic, 'R' will RENUMBER your program *completely* starting at line 10! This is because *MTK* routines are called in the form:

R range,start,increment

But if no additional information is added to the prime call letter, then default values are assumed; in this case: 'range' — the entire program; 'start' — 0; and 'increment' — 10. Having default values assumed is useful on the one hand, but on the other there's then no option to escape. This option of range is a nice feature of *MTK* and obviously *vital* for a good RENUMBER; it's also very useful in specifying a range of lines in which to FIND or SUBSTITUTE.

MTK has a neat feature where Space and the 'K' key pressed together change the cursor to its K mode and where the next key pressed generates its associated keyword — so saving the common need to key in THEN... KEYWORD followed by delete THEN! RENUMBER will only work within a sequential block of lines and to change the order of blocks, you'll have to use MOVE. This brings us to the only apparent bug in *MTK*. On MOVEing a block of lines, you may want to alter the GO TOs, GO SUBs and so on, that refer to this block. They will still have the old numbers and the obvious ploy is to use the facility provided — SUBSTITUTE. But be warned, although the routine will appear to work, in this case it does not. It will provide a string, and not a substitute number! Your program won't recognise these pseudo-numbers, so use FIND and LIST instead and then make the necessary changes individually.

In addition to the more usually found REMKILL, to save on memory space, *MTK* also offers the option of PACK which will 'pack' multiple statements into single lines. Going yet one stage further you also have COMPRESS which will replace explicit numeric constants in a form that the computer recognises but which, in certain instances, can save a considerable amount of memory space.

Not only does *MTK* have a versatile range of toolkit routines, it also provides the facility of programmable function keys. Ten keys ('0'-'9') may be user-defined either to simply print the specified function (keywords, variables, text, etc) or to print *and* ENTER — altogether a very desirable feature. DISPLAY VARIABLES is a *complete* LIST including all elements of arrays (all variables except for FOR... NEXT loops are displayed in lower case, even if you've programmed them in capitals). *MTK* does not have auto-line number or a display of user-defined graphics.



TT-S TIMEDATA

This tape from Timedata not only has a toolkit (called *Gamma*) that's much like the foregoing, but also four other utility programs — high resolution screen drawing, user-defined graphics creator, a tape header analyser, and a machine code memory test program. With this, you certainly get your money's worth!

The toolkit program comes first and you load it by keying LOAD " ". This auto-RUNs and immediately sets two general safeguards — NEW is inhibited so you can no longer accidentally erase your program and it's impossible to overwrite an existing program line. Thus you have an excellent line editor; type in the line you wish to EDIT, press any keyword key and the line is displayed at the bottom of the screen. If required, it may be deleted by either DELETE or by typing in the line number and keying Enter.

Once you've invoked the toolkit by hitting the '0' key with the Symbol Shift key pressed, routines are all single key entries. AUTO line number and DELETE need no comment. FREE not only displays the free memory available, program and variable space but also the current values of the system variables; it also shows the current user-defined graphics characters. HELP displays the toolkit routines and their associated keys; FIND will hunt out occurrences of a specified string starting its search from a specified line number (defaulting to line 0 if no start is given).

Only the line numbers are displayed — no program lines are LISTed. RENUMBER will only work within a sequential block of lines (renumbering all GO TOs, GO SUBs, etc). MOVE is superior to other versions in that it also renumbers all references to the new block of lines (providing they're not in the form of GO TO 330+R). In fact MOVE is so good one wonders why *Gamma* has got both RENUMBER and MOVE! Both commands are 'intelligent' in that they'll close up the specified line increment, even where you've not allowed sufficient space! It's also possible to have lines going up to line 16000 (normal maximum is 9999). The first two digits of these extended lines are replaced by a non-numeric character and they can't be edited (although they can be RENUMBERed or MOVEd). References to these lines elsewhere will have to be changed for the program to function correctly — for instance, GO TO < 350 becomes 12350.

The keyword, VARIABLES, LISTs variables but arrays are only shown by their dimensions. F/N is put against variables used in FOR...NEXT loops together with the line number of the FOR statement. TRACE is an interesting variant in that not only can you select the delay (from single-step up to about five seconds) but in addition to displaying the current line number, it'll

also show the current values of specified variables.

All the *TT-S* programs will run on either 16K or 48K Spectrums, with or without Interface 1 and Microdrives. Routines are even provided that enable you to copy these programs on to a Microdrive wafer.



DK'TRONICS ZXED

This toolkit has been on the market for a long time (in computer program terms) and it's one I've used extensively over the last two years. These days, coming with additional options, *ZXED* is still easy to use and reasonably foolproof. On LOADing, it automatically relocates in memory to suit either 16K or 48K Speccy. It has a short Basic call routine starting at line 9900 and the toolkit functions are invoked by GO TO 9900. I have the following two lines at the beginning of my programs:

```
1 GO TO 100
2 GO TO 9900
```

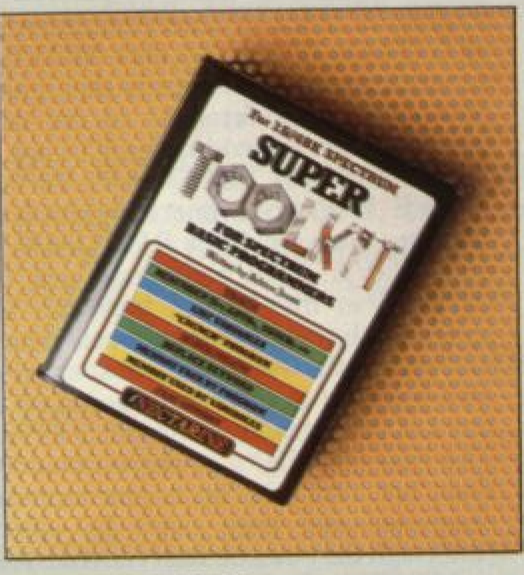
Where line 100 is the true start of my program. Once called, the display will show a flashing 'T' cursor in the bottom left corner of the screen — all toolkit routines are now obtained by a single key operation. H — HELP will display the routines and their call letters.

ZXED is very 'user friendly' . . . call R — RENUMBER and you will be asked 'from line' . . . followed by 'to line' . . . 'new base' . . . and finally 'increment'; there's no need to refer to the manual here! You don't even have to give actual line numbers, providing of course that the portion you wish to RENUMBER falls within the line numbers you have specified. There are a few points to watch out for: 1,) when you MERGE *your* program with the previously LOADed toolkit, you must *not* have any lines in the range 9900 to 9916 — *ZXED*'s Basic call routine; 2.) if you wish to APPEND — to add further commands or text to an existing line(s) — you *must* remember to start with a colon; and 3.) SEQUENCE (Auto line number) will not differentiate between an unused line number and one already assigned.

RENUMBER will only renumber sequentially within a specified block of lines; in other words, if you have blocks of lines starting at 100, 500 and 1000, you can RENUMBER the block at line 100 anywhere *up to* the start of the next block (anywhere between one and 500). If your new block of lines overwrites existing lines (at say line 500) then *ZXED* will *not* implement your command and will print an appropriate error message.

On completion of a successful RENUMBER, all GO TOs, GO SUBs, RESTOREs, LISTs, LLISTs, RUNs, SAVEs and line references are renumbered with the exception of computed GO TOs, GO SUBs, etc, (for example GO TO 330+R) but *ZXED* will LIST these for your inspection. If you do wish to move an entire block of lines to elsewhere within the program, then MOVE will do this. But you must make a note of all references to line numbers calling into this block from elsewhere in the program and alter them individually. To help you do this you can use FIND. *ZXED*'s FIND is probably one of the best I've come across and on calling it, you are asked to enter the search string (keywords, variables or text). Having done so, all lines with this search string will be LISTed to the screen.

ZXED also gives the option of a reduced package of routines (on the other side of the tape) which take up less memory; here the options are reduced to BYTES (Free Memory), DELETE, RENUMBER and SEQUENCE. This facility can be useful if you have a long program which needs some tidying up!



NECTARINE SUPER TOOLKIT

This is quite a newcomer to the market and uses an interrupt mode of operation. In theory, therefore, a routine using this mode can be inserted and performed between the computer's regular cycle of operations. Of course, the computer has to display a screen picture, and it also has to work out the computations that you've set within your program; it can't do these simultaneously and so it carries out the various manoeuvres in strict cyclic order. Interrupting this order and performing another operation can be highly beneficial in certain circumstances, although with this toolkit I'm not so sure.

Nectarine goes to some pains to tell the user not to use *Super Toolkit* with Interface 1 connected (ie. Microdrives) or with a machine code program using interrupts; despite that, a new version will be available soon on Microdrive cartridge. The introduction in the instruction manual says "all in all these features (the toolkit routines) add up to make *Super Toolkit* the most useful, powerful and user friendly suite of utility programs available to Spectrum Basic programmers". I'll let you make up your own minds on that one. . . just don't write in if you disagree with it.

The tape provides versions for both the 16K and 48K Spectrums, plus there's a demonstration program. That's sensibly placed *after* the two toolkit programs, obviating the need to grind through it each time you want to LOAD your toolkit. If you've keyed in LOAD " " (for the demo), don't get worried if your Spectrum appears inert — it's merely ignoring the first two machine code programs on the tape.

To LOAD *Super Toolkit* (48K version) type 'CLEAR 62838:LOAD "48" CODE' and having got a successful LOAD, enter 'RANDOMISE USR 62839' to activate the routines. You can then LOAD or enter your program. To call the commands, simply press Enter and the relevant key (for example, Enter and the 'M' for the MEMORY MAP). If you have RUN your program, first enter PRINT, REM or CLS to enable the toolkit.

The routines themselves are somewhat limited in operation: RENUMBER will *only* renumber the complete program; you can choose the 'start line' and 'step' but not a finish line! The manual says "it looks neater and is easier to debug if the lines are all numbered in equal steps". I suppose it does look neat but I prefer to keep my programs structured (loosely) in blocks — for instance, all initialisation, DIMs, etc, starting from line 100; important GO SUBs from line 500; the main program starting from line 1000; and DATA from line 8000. Then I *always* know where to look for specific routines, whereas here one use of Enter and the 'R' key and I'd be lost.

Super Toolkit does not renumber computed lines (GO TO 330+R, etc) which is fair enough as neither do any of the others. But it does *not* tell you if or where any such lines may be. BLOCK

DELETE functions correctly but is a trifle slow. There's no FIND but there is REPLACE KEYWORD, which only works on keywords (PRINT, REM, LIST, and so on). You're asked for the CODE of the old keyword and the CODE for the new — and this you will have to look up in your Spectrum manual (pages 183-188). Although this works well, the routine seems a little limited. The only use for it that comes to mind is that suggested in the instructions — PRINT to LPRINT!

There appears to be a bug in the LIST VARIABLES routine; although it produced a screen display, the keyboard always locked-up after its use. That means the power supply has to be switched off and back on again, to regain control (with the subsequent re-LOADing of both the toolkit and the program). The VARIABLE LIST indicates an array with two brackets but doesn't give the dimensions.



STAR DREAMS ZX TOOL KIT

This package, though not so well publicised as *ZXED*, has been available for nearly as long and has been upgraded slightly to include a SEARCH and LIST routine and limited Microdrive information (by calling MEMORY MAP). Two versions are provided (on either side of the tape), one each for 16K and 48K machines. Operation is slightly more fiddly than with *ZXED*. For instance, to call the RENUMBER routine, you have to key in RANDOMISE FN r (start line, finish line, new start line, step) including the brackets and commas. All GO TOs, GO SUBs and so on are renumbered (with the exception of computed line numbers) and these must be altered (if necessary) individually. To help the programmer these are displayed 'flashing' within the LISTing. If you wish to RENUMBER outside a sequential block then, as in *ZXED*, you have to use MOVE. However, with this toolkit, while the lines are MOVEd to a new position in the program LISTing, their original line numbers are retained. This enables you to use RENUMBER on these lines (to put them in their right sequence), which will then alter all the relevant calls to this block anywhere in the program — clever stuff!

On all calls that involve displaying a result (SEARCH and LIST, MEMORY MAP, VARIABLES DUMP, and so on) you *must* specify the output device. Sadly, SEARCH and LIST only displays line numbers of the occurrence and does not LIST the full lines. MEMORY MAP gives a fair bit of information, including the size of the program and bytes free, and displays the user-defined characters. The TRACE routine displays the current line number of a RUNning program at the top right of the screen and the speed of program operation is selectable from normal down to very slow. The VARIABLES DUMP is useful but fails to list individual elements of arrays, giving only the lengths of string variables.

Unusually, *Star Dreams* has also included a HEX DUMP starting at a specified memory location. Those with a little time to spare who are interested in what goes on inside the Spectrum will find this facility provides good reading. YS

ADDING ZIP PART FOUR

ZIP TO THE STARS

If you're looking for further proof that* Simon Goodwin's *ZIP compiler is nothing short of miraculous, type in his example program and give it the treatment.

ZIP does not allow string handling, which makes it a little difficult to handle text entry. The INKEY$ subroutine provided within this article is suitable for reading 'High Score' names and other simple text — GO SUB 4500 has the same effect as the Basic line:

```
LET k = CODE INKEY$
```

As you might expect, k is set to zero if no key is depressed. You can use this routine to store strings of text in numeric arrays. If you are writing a game, it's unlikely that the INKEY$ function would have been useful anyway since it cannot detect cases when more than one key is depressed. The *Star Base* program shows how multiple key presses can be detected and also contains short routines to simulate the BEEP statement and the RND function.

SPEEDING UP YOUR ROM

One of the main weaknesses of *ZIP* is that it compiles slowly. In our experiments we found a single change which brought about a remarkable increase in speed. After an extra line was added, Pass 1 was more than twice as fast and Pass 2 was accelerated by about 40 per cent. The line:

```
5047 LET t=1: LET l=t: LET j=t:
     LET s=t: LET p =t: LET pc=t:
     LET z=t: LET s2=t
```

Was the only change needed to produce this speed-up!

To understand the way line 5047 works, you need to go back to the 'reasons for using a compiler' which we listed in Part One of this series. Compiled programs are faster than their interpreted equivalents, partly because the computer does not have to search for lines, variables and errors once a program has been compiled.

When you ran the original version of *ZIP*, ZX Basic built a table of variable names and values in the order they were encountered in the program. To make the listing easy to read, *ZIP* uses lots of 'manifest constants' — names instead of numbers — and consequently the variable table gets filled up with entries like 'CAPITAL A', 'ENTER', 'INDEX', and so on. ZX Basic has to wade through all of these entries before it finds the 'working variables' used later on. Line 5047 makes sure that the most commonly-used variable names are at the start of the table.

This change reduces the time spent searching the variable table by so much that it dramatically increases the speed of ZX Basic. The tip is just as valid in other ZX Basic programs, though it will not yield much advantage in programs which use few variables.

IT'S IN THE STARS

The program, *Star Base* was written to show the power of the *ZIP* compiler. *Star Base* is a graphics game with sound effects: you find yourself in the space-station at the centre of the screen with green meanies tumbling towards you from all directions. Armed only with a Super Sub-Meson Warp Laser (and a limited supply of Sub-Mesons) you must repel the alien hordes in the usual manner. You can swivel the laser to point in any direction, but you must be quick — the longer you play, the faster the game gets and the more aliens attack at once.

```
4495 REM **** INKEY$ rout
ine
4500 LET k=IN 254
4505 LET k=k-INT (k/32)*3
2
4510 IF k=31 THEN POKE 23
560,0
4520 LET k=PEEK 23560: RE
TURN
```

The routine to recreate a *Zippable* INKEY$. To use it, type GOSUB 4500, and then the code of the last key pressed will be held in the variable 'k' on return from the subroutine.

As it stands *Star Base* is a simple but addictive game — it would be easy to enhance it by adding user-defined graphics, orbiting aliens, 'High Score' tables and so on. The listing only occupies about a third of the memory available to *ZIP*, so there's plenty of room for extra features should you feel enthusiastic.

Reset your computer before typing in the program as listed. RUN it using the normal Basic interpreter, to ensure that you've made no copying mistakes. In Basic the game is very slow, especially at the higher levels when up to five aliens can attack you at once. The program starts by asking you to enter a speed factor — even zero, the highest speed, is pretty slothful in Basic. *ZIP* is clearly called for.

The next step is to save the *Star Base* program on cassette or Microdrive. Load *ZIP* and its library, then use the MERGE command to add the *Star Base* program. Start *ZIP* by typing GO TO 5035, then wait as the game is compiled. ZIP runs slowly — it takes about half an hour to compile the game — but the results are impressive. You can save the compiled code separately and run it later with a simple USR call.

LINE BY LINE

Most of the *Star Base* program is quite straightforward. Lines 10 to 1210 initialise the game, and the loop between lines 2000 and 2100 calls a group of subsequent subroutines which handle the graphics and sound.

The subroutine from lines 3000 to 3040 reads the control keys. It's compatible with the Sinclair Research joystick interface, and is used in preference to the INKEY$ subroutine because it can detect cases when more than one key is pressed — allowing you to turn and fire at the same time, for example.

The position of each alien, and the direction in which it is moving, is stored in the arrays P() and D(). The subroutine from line 3400 onwards converts this 'vector' information into vertical and horizontal co-ordinates, making it easy to add extra directions. The values zero to seven in D() represent a ring of directions around the base, at 45 degree intervals.

The current number of simultaneous attackers is stored in N. Make the arrays bigger and alter the test in line 3800 if you think you can handle more than five attackers at once! Line 3610 generates appropriate effects when the aliens finally zap you. The compiled routine is about 400 times faster than the original Basic.

Line 4530 is a simple pseudo-random number generator. It stores an unpredictable value between zero and 100 in the variable Q each time it is called. The Spectrum timer is used to jumble the sequence. A statistician would probably find the technique horribly crude, but it works well.

A short machine code routine is used to call the Spectrum's BEEP routine;

```
  10 REM STar▮BASE ZIP DEMO GAME
  20 REM
  30 REM (c)1984 Simon N Goodwin
  40 REM
  80 REM
  90 REM **** INITIALISATION
 100 DIM d(5): DIM p(5): LET p=1: LET q=
PEEK 23692+1: LET j=1: LET a=500: LET s=
0
 110 OVER 0: PAPER 0: INK 5: FLASH 0: BR
IGHT 0: INVERSE 0: CLS
 120 PRINT TAB 11;"STAR BASE!"'''TAB 7;"
By Simon N Goodwin"''''"       Control key
s... 0 Fire"''" 7 Clockwise   6 Anticloc
kwise"''''" Enter Delay factor (0=fastes
t)"
 130 INPUT d: IF d<0 THEN  GO TO 130
 140 BORDER 0: CLS
 150 INK 6: FOR i=16 TO 160: GO SUB 4530
: LET x=q*2+28: PLOT x,i: NEXT i: INK 4
 170 PAPER 1: PRINT AT 21,0; INK 7;"  AM
MO=500            SCORE=0    ";AT 0,0;" S
TAR BASE!  HYPERSPACE SCANNER "
 180 FLASH 1: INK 0: FOR y=1 TO 20: PRIN
T AT y,0;CHR$ 140;CHR$ 140;AT y,30;CHR$
140;CHR$ 140;: NEXT y: INK 4: PAPER 0: F
LASH 0
 200 POKE 23500,17: POKE 23501,7: POKE 2
3502,0: POKE 23503,33: POKE 23505,5: POK
E 23506,195: POKE 23507,181: POKE 23508,
3
1000 PRINT AT 10,15;CHR$ 141;CHR$ 142;AT
 11,15;CHR$ 135;CHR$ 139;
1010 OVER 1: PRINT AT 10,15;")(";AT 11,1
5;")(";
1100 PAUSE 0
1200 LET w=0: LET n=1: FOR i=1 TO n: GO
SUB 3800: NEXT i
1210 GO SUB 3000: GO TO 2010
1980 REM
1990 REM **** MAIN LOOP
2000 GO SUB 3000
2005 PLOT 127,88: DRAW x,y
2010 LET p=p+r-l: IF p>95 THEN  LET p=0
2015 IF p<0 THEN  LET p=95
2020 LET t=p-INT (p/24)*24: IF p<24 THEN
  LET y=12: LET x=t-12: GO TO 2040
2025 IF p<48 THEN  LET x=15: LET y=12-t:
 GO TO 2040
2030 IF p<72 THEN  LET x=12-t: LET y=-12
: GO TO 2040
2035 LET x=-15: LET y=t-12
2040 PLOT 127,88: DRAW x,y
2070 GO SUB 3200
2080 IF f THEN  IF a THEN  LET a=a-1: PR
INT  OVER 0;AT 21,7;a: POKE 23505,0: FOR
 t=2 TO 5: POKE 23504,t*2: INK t: DRAW x
*5,y*5: INK 4: GO SUB 3200: RANDOMIZE US
R 23500: INK t: DRAW x*-5,y*-5: NEXT t:
INK 4: POKE 23505,5
2090 FOR i=0 TO d: NEXT i
2100 GO TO 2000
2980 REM
2990 REM **** READ KEYBOARD
3000 LET k=IN 61438
3010 LET k=k-INT (k/32)*32
3020 LET l=k>=16: IF l THEN  LET k=k-16
3030 LET r=k>=8: IF r THEN  LET k=k-8
3040 LET f=INT (k/2)*2=k: LET l=NOT l: L
ET r=NOT r: RETURN
3180 REM
3190 REM **** MOVE ENEMIES
3200 LET j=j+1: LET i=INT (j/7): IF i>n
THEN  LET j=0: POKE 23505,2: RANDOMIZE U
SR 23500: POKE 23505,5: RETURN
3205 IF i*7<j THEN  RETURN
3210 IF p(i)=9 THEN  GO TO 3600
3220 IF p(i)<0 THEN  LET p(i)=-p(i): GO
SUB 3400: PRINT  OVER 0;AT v,h;" ";: GO
SUB 3800: GO TO 3300
3230 GO SUB 3400: PRINT AT v,h;
3240 IF ATTR (v,h)=5 THEN  PRINT  OVER 0
; INK 2;"*";: POKE 23504,250: RANDOMIZE
USR 23500: LET p(i)=-p(i): LET s=s+10*n:
 PRINT  OVER 0;AT 21,27;s;: POKE 23504,1
27: RANDOMIZE USR 23500: GO TO 3300
3250 LET p(i)=p(i)+1
3260 PRINT  INK 6;"O";: GO SUB 3400: PRI
NT AT v,h;"O";
3300 RETURN
3380 REM
3390 REM **** CONVERT VECTOR
3400 LET v=10: LET h=16
3410 IF d(i)=7 OR d(i)<2 THEN  LET v=p(i
)
3420 IF d(i)>2 THEN  IF d(i)<6 THEN  LET
 v=21-p(i)
3430 IF d(i)>4 THEN  LET h=5+p(i)
3440 IF d(i)<4 THEN  IF d(i)<>0 THEN  LE
T h=26-p(i)
3450 RETURN
3580 REM
3590 REM **** GAME OVER FX
3600 PRINT AT 2,11; OVER 0;"GAME OVER!"
3610 POKE 23505,3: FOR i=7 TO 48: POKE 2
3504,i*4: RANDOMIZE USR 23500: FOR j=225
28 TO 23295: POKE j,i: NEXT j: NEXT i: S
TOP
3780 REM
3790 REM **** MAKE AN ENEMY
3800 LET w=w+1: IF w>20 THEN  LET w=0: I
F n<5 THEN  LET n=n+1: LET p(n)=-1: LET
d=d/2
3810 LET p(i)=1: GO SUB 4530: LET d(i)=I
NT (q/13): GO SUB 3400: PRINT AT v,h;"O"
;
3820 RETURN
4510 REM
4520 REM **** RANDOMish NUMBER
4530 LET q=q*99+PEEK 23692: LET q=q-INT
(q/101)*101: RETURN
```

Starbase — not quite 'the final frontier' while running in Basic, but when this program is Zipped...smooth action arrives. Prevent the invaders from overtaking your base using key '7' to turn clockwise, '6' for anticlockwise and '0' to fire your lasers.

line 200 POKEs in the machine code. RAND USR 23500 produces a single beep. All Spectrum sound-effects are made up of a sequence of 'ticks' sent to the loudspeaker. The pitch generated (the time delay between ticks) is stored in locations 23504 and 23505, and the duration (number of ticks sent) occupies locations 23501 and 23502. In both cases the first location provides 'fine tuning' and the second allows large changes in pitch or duration. The 'Shift Enter' facility to stop machine code is temporarily turned off during a BEEP call — otherwise the intermittent keyboard check would make the note sound unsteady.

The Spectrum BEEP command allows you to specify note durations in seconds and pitches in tones. However, this versatility makes BEEP very slow — it's hard to produce interesting effects from Basic because of the gaps between notes while the durations and pitches are converted into a form which the computer can use. The *ZIP* routine is much faster, but the values must be converted and POKEd by the programmer. This is fine for Basic but inconvenient for music.

If you find the game too easy or too hard, you can alter the relative speed of aliens and laser by replacing the '7' in lines 3200 and 3210 with some other value — increase the number to slow the aliens. This is the sort of feature that's easy to incorporate when you use a compiler, but much harder when you write a game in Basic (where everything must go flat out if the game is to be worth playing at all).

The main limitations on the speed of *Star Base* are the sound effects, PRINT and DRAW commands. These ROM routines take longer than all the rest put together. Even so, *ZIP* speeds up *Star Base* by an overall factor of about 20. The longer the program, the greater this

factor will be; since Basic takes progressively longer to find each variable or line.

It takes a little thought to design programs to be compiled using *ZIP*, but the results are well worthwhile. Armed with the listing and these notes, you should be able to expand the program to support other features of ZX Basic.

FINALLY...

This series was intended to be more than just a useful listing and a set of user-notes. The aim was to show that you don't need a degree, disk drives or a mainframe to write complex software. What you do need is a good plan of attack, lots of paper and plenty of time to think.

One of the most exciting things about personal computing is that it gives people at home the chance to be at the very forefront of a discipline. You can't split atoms with an axe, or discover new elements on the hob of your stove, but your Spectrum can plod through almost everything that the academics can do with their air-conditioned superconducting Megamachines (which sometimes even then is not very much!)

Yet many hobbyists get bogged down when they try to write programs more complicated than simple games or 'Hex-to-decimal' converters (our postbag suggests that about 25 per cent of all programs are Hex-to-decimal converters!). You need some sort of 'design' skill before you can write complex software and the skill has to be learnt — no-one is a born programmer.

Structured programming teaches that skill. We've shown the (albeit imperfect) structure of a Basic compiler, and the way it was designed, to illustrate just how *you* could tackle a big programming project. May the *ZIP* be with you! YS

ZIP COMPILER OFFER

If you want to save the wear and tear on your overworked fingers (not to mention your Speccy's keys), a copy of the *ZIP* compiler, library and demo program is available on cassette by post from *Your Spectrum*.

Priced at only £3.50 per copy, inc p&p (for overseas customers, the price of *ZIP* is £4.50 sterling), the tape includes Hi-res graphics commands, and comes complete with instructions and notes on how the program works. Compiled programs run *without ZIP* loaded!

To obtain your copy of *ZIP*, simply fill in the coupon below (or a photocopy if you don't want to deface your issue) and send it off without delay!

Please rush me ____ copy/ies of the *ZIP* compiler. I enclose cheque/postal order for £____ made out to *ZIP Compiler Offer*.

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GROUND ATTACK

BY ANTONY CRAWFORD



The alien craft appear at the top of the screen and hover menacingly in the distance. All you have to do is manoeuvre the craft into your sights — the area in the centre of the screen. Note the professional use of graphics to create the inside of the space station.

Ever had one of those days when your entire world is under threat from an invading alien fleet? Well, all the other clever inhabitants have piled into their space vehicles and are hanging around in space waiting for the uninvited guests to leave and move on to another planet. But, having pulled the short straw, you're the only one left on the planet and you've been placed in charge of the main defence unit — base station Alpha — and it's your task to dissuade the aliens from doing too much damage to the cities while they're there.

Protecting Home World is fairly easy using the strengths of base station Alpha — all you have to do is to track the alien craft in your sights and let them have it with the unlimited supply of laser bolts. But time is not on your side! You have a limited period of time to obliterate the aliens before you see Home World's precious cities appear on the horizon and, although deserted of their population, they do provide huge targets. Once one of the cities has been bombed, the aliens take off to re-arm themselves in their main fleet and another craft is sent down. Your job is to cause them so much damage that they think of Home World as a bad bet to invade proper!

When you first type in the program and RUN it, you will be given all the instructions for play. The controls used are the '5' key to move the sights left and the '8' key to move them right. The '6' key is used to fire the lasers. The scoring system is based on the difficulty level you select — between 20 and 100. As the time ticks away, you must home in on the alien craft and destroy it; if you let the counter get to zero, you'll see the cities come into sight and you may well find them going up in smoke if the craft should hover over them. 100 points are awarded for each craft you destroy, plus the number showing on the counter; should you leave it too long and the counter starts indicating a minus number, this will be deducted from your score. Once three of Home World's cities have been decimated, the game is over — so make sure your score is high enough ... or they'll be back!

This game was selected for publication as much as anything else for its superb graphics — matching some of the best commercial packages around. Note the clever use of the FLASH command, and the way the alien craft split up when you land a laser bolt on target. Once you've SAVEd the program to Microdrive or cassette, you'll find it autoRUNs and after each game you'll be offered the chance of another. There is also a 'high score' facility — so if you like seeing your name in lights, you'd better get your eye in quickly.

```
   0>REM @GROUND ATTACK((((ANTONY CRAWFO
RD)))) MON.2.4.1984
   1 REM Improved & Annotated By Gavin M
onk
   2 LET hs=0: LET h$="NO ONE YET"
```

Line 2 Sets the 'high score' details.

```
   3 FOR i=144 TO 155
   4 FOR j=0 TO 7: READ b
   5 POKE USR CHR$ i+j,b: NEXT j: NEXT i
```

Lines 3-5 Set up the user-defined graphics.

```
   6 DATA 0,0,0,0,0,3,191,0,0,0,0,0,0,19
2,253,0,192,32,49,59,127,255,227,192,3,4
,140,220,254,255,199,3
   7 DATA 0,255,0,0,255,255,255,0,144,14
4,255,213,255,157,157,255,9,9,255,171,25
5,185,185,255,0,0,90,255,189,231,195,195
   8 DATA 255,127,63,31,15,7,3,1,255,254
,252,248,240,224,192,128
   9 DATA 240,240,240,248,24,4,2,1,15,15
,15,31,24,32,64,128
```

Lines 6-9 Contain the data for the user-defined graphics.

```
  10 BORDER 0: PAPER 7: INK 0: CLS : GO
```

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fantasy
SOFTWARE
"Ziggy turned, his fingers clutching the trigger of his capsule gun, something had startled him or had it?
He looked back, he had grown very tired from his many exploits in THE PYRAMID negotiating 120 different chambers and coming face to face with some pretty nasty aliens.
No sooner than he had accomplished this mission, he was summoned by Time Lord Hamilton (known as Super Ham to his friends) to go to DOOMSDAY CASTLE and to save the Universe from the infinitely evil Scarthax, this being no small task took several megayears. By this time Ziggy was completely exhausted, his capsule battered, dented and wobbling as he limps in the direction of home, a real super hero of our time. Unable to leave the Universe undefended he radioed his great friend and colleague Beaky on the planet of Crackit to stand guard until his return.
Beaky would normally assume this role without a second thought, however he had his own problems to face for the dreaded Eggsnatchers had returned to threaten the very existence of his breed. Beaky's survival instincts do not allow him to leave Crackit until he has reared enough chicks to fight off the Eggsnatchers. In order to crack it, he must pass through 12 different stages each getting progressively harder.
So we have it, Ziggy returning home for a complete refit under the illusion that Beaky is defending the Universe, surely it can't take Beaky that long to secure his own species and when will Ziggy be back.....?"
SPECTRUM 48K:-
The Pyramid £5.50
Beaky & The Eggsnatchers £5.50
Doomsday Castle £6.50
COMMODORE 64K:-
The Pyramid £6.50
Beaky & The Eggsnatchers £5.5
Disc Versions £9.50
Available from all good software outlets.
FANTASY SOFTWARE,
Fauconberg Lodge, 27A St. George's Road,
Cheltenham, Gloucestershire.
Telephone: (0242) 583361.
Trade enquiries welcome.

```
SUB 4000: INPUT "DIFFICULTY 20-100 ";tco
```

Line 10 Sets the screen attributes, calls the routine at line 4000 to print up the instructions for the game, and asks you to input the difficulty level required (20 is difficult, 100 is a little bit easier).

```
 20 INK 0: DRAW 255,0: DRAW 0,175: DRAW
-255,0: DRAW 0,-175
```

Line 20 Draws the display outline.

```
 21 GO SUB 900
 22 GO SUB 1000
 24 GO SUB 1500
```

Lines 21-24 Display the main screen area.

```
 25 LET lf=3
 26 LET sc=0
 27 DIM A$(1,44)
 28 LET A$(1,32 TO 35)="acdb"
 30 LET A=4: LET B=9: LET C=1: LET x=IN
T (RND*34): LET y=4: GO SUB 3000: LET tc
o=tco-1: LET co=tco
```

Lines 25-30 Set up the variables and arrays: lf — lives; sc — score; A$ — alien; and tco — the difficulty level (this is reduced as you play the game).

```
 31 PRINT AT 15,17; PAPER 1; INK 7;"SCO
RE";AT 16,17;"     ";AT 16,17;sc;AT 18,1
7;"TIME ";AT 19,17;"      "
```

Line 31 Completes the display by printing the time and score in the front panel.

```
 90 LET co=co-1: PRINT AT 19,17; PAPER
1; INK 7;co;" "
 91 IF co=0 THEN  FOR k=1 TO lf: PRINT
AT 11,INT (RND*15)+4; PAPER 1; INK 4;"fh
g": NEXT k
 92 IF ATTR (11,34-x)=12 AND co<0 THEN
 PRINT AT 11,32-x; OVER 1; PAPER 1; INK
3;"****": LET A=9: LET B=4: LET C=-1: LE
T sc=sc+co: GO SUB 3000: LET lf=lf-1: GO
 TO 2000
```

Lines 90-92 Decrease the time (co) and if it equals zero (ie. the alien craft has not been shot yet) this routine prints the Home World cities on the horizon. Line 92 destructs the cities if the alien craft flies overhead.

```
 100 IF INKEY$="" OR INKEY$="6" THEN  LE
T z=INT (RND*3): LET x=x+z-1: BEEP .005,
x
 110 IF INKEY$="5" THEN  LET x=x+1: BEEP
 .005,x
 115 IF INKEY$="8" THEN  LET x=x-1: BEEP
 .005,x
 116 IF INKEY$="6" THEN  LET f=1: PAPER
1: INK 7: FOR i=4 TO 8 STEP 2: BEEP .002
,i: PRINT AT i,f+9;"k";AT i,22-f;"l";AT
i,f+9;" ";AT i,22-f;" ": LET f=f+2: NEXT
 i
```

Lines 100-116 Read the control keys. You may like to change these to suit your own tastes, or even to make use of a joystick. For those who do want to alter these lines, please take a look at line 140 and don't forget to change the text in the instructions.

```
 120 LET Px=x+29
 121 IF x<2 THEN  LET x=1
 122 IF x>15 THEN  LET Px=44
 130 PRINT AT y,1; PAPER 8; INK 7;A$(1,x
 TO Px)
 140 IF INKEY$="6" AND 34-x=15 THEN  LET
 sc=sc+100+co: PRINT AT 9,14; PAPER 1; I
NK 2; OVER 1;"@**@": GO SUB 500: GO TO 2
000
 400 GO TO 90
```

Lines 120-400 Monitor the alien ship and check to see if it has been destroyed (line 140).

```
 500 LET fh=9
 501 PAPER 1: INK 6
 502 LET tr=15: FOR j=16 TO 28
 503 BEEP .005,j: PRINT AT 9,j;" ";"b";A
T 9,tr-1;"a ";AT fh,tr;" ";AT fh,j;" "
 504 LET tr=tr-1: LET fh=fh-.3
 505 BEEP .002,fh: PRINT AT fh,tr;"c";AT
 fh,j;" d": NEXT j
 590 RETURN
```

Lines 500-590 This routine makes the alien craft explode into little pieces if one of your laser bolts hits home.

```
 900 PRINT AT 3,10; PAPER 1;"
 "
 902 PRINT AT 2,10; PAPER 1;"
 "
 903 PRINT AT 3,9; PAPER 7; INK 0;"i";AT
 3,22;"j";AT 2,7;"i   ";AT 2,22;"   j"
 904 PRINT AT 3,7; INK 7; PAPER 1;"i";AT
 3,24;"j"
 906 PRINT AT 3,3; PAPER 1;"    ";AT 3,2
5;"    "
 909 FOR i=4 TO 11
 910 PRINT AT i,1; PAPER 1;"
                              "
 920 NEXT i
 930 RETURN
```

Lines 900-930 Print the main view through the cockpit window of base station Alpha.

```
 1000 INK 7: PLOT 8,80: DRAW 240,0: INK 0
 1001 PRINT #1; INK 7;"HIGH SCORE ";hs,"
BY ";h$
 1002 FLASH 1: PRINT AT 12,1; PAPER 6;"ee
eeeeeeeeeeeeeeeeeeeeeeeeeeee"
 1003 PRINT AT 13,1; PAPER 6; INK 0;"
                              "
 1004 PRINT AT 14,1; PAPER 6; INK 0;"
   ";AT 14,23;"        "
 1005 PRINT AT 15,1; PAPER 0; INK 6;"
   ";AT 15,23;"        "
 1007 PRINT AT 16,4; PAPER 0; INK 6;"
 ";AT 16,23;"      "
 1008 PRINT AT 17,4; PAPER 6; INK 0;"
 ";AT 17,23;"      "
 1009 PRINT AT 18,4; PAPER 6; INK 0;"
 ";AT 18,23;"      "
 1010 PRINT AT 19,4; PAPER 6; INK 0;"
 ";AT 19,23;"      "
 1011 PRINT AT 20,4; PAPER 0; INK 6;"
 ";AT 20,23;"      "
 1012 PRINT AT 21,4; FLASH 0; PAPER 7; IN
K 0; OVER 1;"hhhhhhhhh       hhhhhhhhh"
 1019 FLASH 0
```

Lines 1000-1019 Print the planet's surface as it seems to rush underneath you. It's the clever use of the FLASH command that gives the impression that you're actually moving.

```
 1020 LET t=3: FOR i=16 TO 18
 1030 PRINT AT i,t; INK 4; PAPER 7;"j";AT
 i,31-t;"i": LET t=t-1: NEXT i
 1040 PRINT AT 16,1; PAPER 4; INK 0;"  ";
AT 16,29;"  ";AT 17,1;"j";AT 17,30;"i"
 1050 PRINT AT 3,1; INK 7; PAPER 2;" i";A
T 3,29;"j ";AT 2,1;"i";AT 2,30;"j"
```

```
1100 PLOT 133,10
1102 DRAW 0,49: DRAW 45,0: DRAW 0,-49: D
RAW -45,0: PLOT 134,34: DRAW 44,0: DRAW
0,1: DRAW -44,0
1109 PLOT 76,10
1110 DRAW 0,49: DRAW 56,0: DRAW 0,-49: D
RAW -56,0: PLOT 81,35: DRAW 46,0
1111 PLOT 73,8
1112 DRAW 0,54: DRAW 109,0: DRAW 0,-54:
DRAW -109,0
1113 PLOT 0,175: DRAW 24,-24: PLOT 255,1
75: DRAW -24,-24
1114 PLOT 40,168: DRAW 16,-16: PLOT 215,
168: DRAW -16,-16
1115 PLOT 40,168: DRAW 0,7: PLOT 215,168
: DRAW 0,7
1120 PRINT AT 18,2; PAPER 0; INK 7;"j";A
T 18,29;"i"; BRIGHT 1;AT 19,2;"j";AT 19,
29;"i";AT 20,2;"j";AT 20,29;"i"; BRIGHT
0
1130 PRINT AT 0,5; OVER 1;"hhhhhhhhhhhh
hhhhhhhhh": OVER 0
1140 FOR j=1 TO 21 STEP 2
1150 PRINT AT j,0; OVER 1;"X";AT j,31;"X
": NEXT j
1160 LET de=0: FOR j=167 TO 153 STEP -2
1170 PLOT 8+de,j: DRAW 32,0: PLOT 247-de
,j: DRAW -32,0: LET de=de+2: NEXT j
1200 FOR i=15 TO 19
1210 PRINT AT i,10; OVER 1; PAPER 4;"
   ": NEXT i: OVER 0
1400 RETURN
```

Lines 1020-1400 Print the base station's dashboard and add a few minor items of detail to the screen to give it a truly professional look.

```
1500 PLOT 2,2
1501 DRAW 251,0: DRAW 0,171: DRAW -251,0
: DRAW 0,-171
1502 PLOT 4,4
1503 DRAW 247,0: DRAW 0,167: DRAW -247,0
: DRAW 0,-167
1504 PLOT 6,6
1505 DRAW 243,0: DRAW 0,163: DRAW -243,0
: DRAW 0,-163
1506 RETURN
1511 INK 7: PLOT 107,94: DRAW 0,-3: DRAW
 40,0: DRAW 0,3
1512 PLOT 107,110: DRAW 0,3: DRAW 40,0:
DRAW 0,-3
1520 RETURN
```

Lines 1500-1520 This routine provides a couple of extra touches to the screen border.

```
2001 IF tco=25 OR tco=25 AND sc>3500 THE
N  LET lf=lf+1: BEEP .05,lf
2002 IF co/tco>.9 THEN  LET tco=INT (tco
/2)
2003 FOR i=1 TO 50: BEEP .001,i
2004 NEXT i
2005 IF lf=0 THEN  GO TO 5000: REM game
over
2006 GO SUB 900
2007 PRINT AT 11,1; PAPER 1;"____________
____________________"
2010 GO TO 30
```

Lines 2001-2010 This routine is called if a city has been destroyed or an alien craft has been shot down. Line 2001 checks to see if another alien craft is to start its attack run. Line 2005 checks for the end of the game.

```
3010 FOR i=A TO B STEP C
3011 PAUSE 10
3020 LET z=INT (RND*5)
3030 PRINT AT y,1; PAPER 1;"
                              "
3040 LET x=x+z-2: LET y=i: LET Px=29
3041 IF x<2 THEN  LET x=1
3042 IF x>15 THEN  LET Px=44
3050 PRINT AT y,1; PAPER 1; INK 9;A$(1,x
 TO Px)
3060 NEXT i
3070 GO SUB 1511: RETURN
```

Lines 3010-3070 Move the ship across the screen at random — so you'll have to be nimble on the '5' and '8' keys if you want to keep the ship in your sights long enough to blast it!

```
4000 FOR I=0 TO 10: FOR j=6 TO 0 STEP -1
4001 POKE 23607,I: BORDER j: OUT 254,16:
 FLASH 1
4002 IF i=10 AND j=0 THEN  POKE 23607,60
4003 PRINT AT 10,9;"GROUND  ATTACK"
4004 PRINT AT 7,14; INK 2; FLASH 0;"acdb
"
4005 NEXT j: NEXT I
4006 FLASH 0
4007 FOR f=0 TO 300: NEXT f
```

Lines 4000-4007 Print the title page of the game. By moving the character set pointer around, the words 'GROUND ATTACK' are made to appear from a bit pattern. The OUT command produces the 'clicks' which come from the Speccy's speaker.

```
4008 CLS : PRINT AT 1,14;"acdb"
4009 PRINT AT 2,9;"GROUND  ATTACK"
4010 PRINT AT 4,0;"  YOU ARE IN COMMAND
OF BASE"''"STATION ALPHA,THE MOST POWERF
UL"''"DEFENCE STATION ON THE PLANET."''"
  USE KEYS 5,6 & 8 TO DESTROY"''"THE ALI
EN CRAFT INVADING YOUR"''"HOME WORLD."
4011 PRINT AT 16,4;"KEYS:-"
4012 PRINT AT 18,6;"6 = FIRE";AT 19,6;"5
 = LEFT";AT 20,6;"8 = RIGHT"
4013 PRINT #1;"PRESS ANY KEY TO CONTINUE
---"
4014 PAUSE 0
```

Lines 4008-4014 Print the first page of instructions for play and wait for a key to be pressed.

```
4015 CLS : PRINT AT 1,14;"acdb"
4016 PRINT AT 2,9;"GROUND  ATTACK"
4017 PRINT AT 4,2;"THE SCORE WILL BE KEP
T AS"''"FOLLOWS:-"''"THE DIFFICULTY LEVE
L YOU ENTER"''"IS A TIME LIMIT WHICH COU
NTS"''"DOWN BACKWARDS"
4018 PRINT AT 14,1;"WHEN YOU HIT A SHIP
YOU SCORE"''"100 POINTS PLUS THE TIME LE
FT."
4019 PRINT AT 18,1;"IF THE TIME IS A ""-
"" THE TIME"''"IS DEDUCTED."
4020 PRINT #0;"GOOD LUCK "
4021 PRINT #1;"PRESS ANY KEY TO START"
4022 PAUSE 1: PAUSE 0
4023 CLS : RETURN
```

Lines 4015-4023 Once you've read the first page of instructions and pressed any key, you'll be presented with the second page.

```
4999 REM game over
5000 BEEP .5,0: BEEP .5,-10: PRINT AT 10
,11; PAPER 2; INK 6; FLASH 1;"GAME OVER"
5010 FOR i=1 TO 200: NEXT i: IF sc>hs TH
EN  GO SUB 5100
5020 GO TO 10: REM start again
```

Lines 4999-5020 The 'end of game' routine. The words 'GAME OVER' are printed on-screen, and a check for a new 'high score' is made; if you haven't managed to beat the highest score, you'll be returned to the title page.

```
5099 REM new high score
5100 PAPER 1: INK 7: FLASH 1
5110 FOR i=1 TO 10
5120 PRINT AT 10,11;"   NEW    ": BEEP .2
5,10
5130 PRINT AT 10,11;"  HIGH    ": BEEP .2
5,20
5140 PRINT AT 10,11;"  SCORE   ": BEEP .2
5,15
5150 NEXT i
5160 FLASH 0
5170 PRINT AT 10,2;"PLEASE ENTER YOUR NA
ME.....  "
5180 INPUT  LINE h$
5190 LET hs=sc
5200 RETURN
```

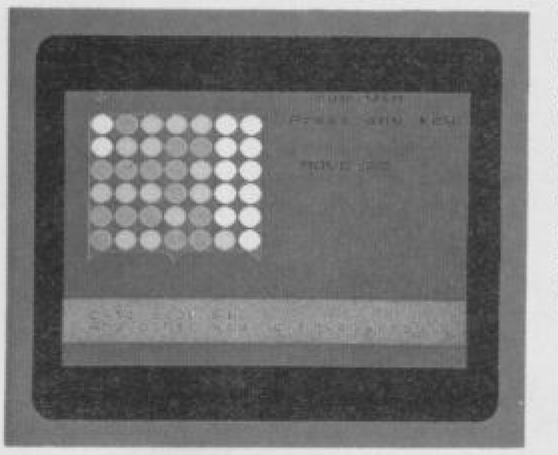
Lines 5099-5200 The 'high score' routine. This flashy little piece of code announces that you've beaten the all-time highest score and invites you to type in your name. It then returns you to the title page and the promise of another game.

```
9998 SAVE *"m";1;"ATTACK" LINE 1: STOP :
 REM microdrive save
9999 SAVE "ATTACK" LINE 1: REM cassette
save
```

Lines 9998-9999 The routines allowing you to SAVE the program to Microdrive or cassette. If you don't have an Interface 1 unit connected, omit line 9998.

CONNECTIONS

BY D R TOSE



The arrow at the top of the grid points to the column you drop your counter into — get four tokens in a row as in the fourth row up and you'll beat the Spectrum. The number of moves made is shown on the right-hand side of the screen.

Here's a game that's full of fun and frustration. Based on a popular board game, the idea is pretty similar to Naughts and Crosses — only this time you've got to line up four tokens in a row!

On-screen you'll be presented with a grid made up of circles on the left side and instructions for play at the bottom. The grid comprises six rows of seven columns each, with an arrow character poised at the top of one of the columns. To release one of your pieces into the column, press the '0' key and it will fall to the lowest free position. If the arrow isn't pointing to the column in which you want to make your move, the arrow can be re-positioned using any key other than the '0' key.

The game is played against the computer and the choice as to who plays first is decided at random by the program. When you've made your move, a message is flashed up on-screen announcing that the computer's thinking — always a good idea if nothing much is happening for a few seconds. The computer will then make its move and it's up to you again.

The way to win is to place your pieces so that you achieve four in a row — either horizontally, vertically or diagonally. Of course, your computerised opponent is using the same tactics as you, so watch out. There are two levels of difficulty — 'easy' and 'hard' (and when it says 'hard', it's not joking!). Each time a move is made, the 'number of moves' counter is incremented and displayed on-screen — just in case you'd like to know how many moves it has taken you to beat the Speccy (assuming, of course, that you do).

Full instructions are provided at the beginning of each game, and when you've reached the final conclusion you'll be offered another game.

```
   5 REM      @ D.R.TOSE
   6 PAPER 1: BORDER 1: INK 7: CLS : PRI
NT 'TAB 7; INK 6;"C O N N E C T   4"
   7 PRINT ''"  The game is played on a
7x6"''"grid and the object of the game"'
'"is to connect four of your"''"pieces i
n a row, vertically,"''"horizontally, or
 diagonally."''
   8 PRINT "  You take turns to drop one
 of"''"your pieces in one of the seven"'
'"columns and it falls to the"''"lowest
free position."
   9 PRINT #1; INK 5;"Press Any Key To P
lay Connect 4": PAUSE 1: PAUSE 0
```

Lines 5-9 Print the title page, complete with instructions for play.

```
  10 PAPER 4: INK 0: BORDER 4: CLS
  15 CLS : PRINT #1;"Level 1-easy 2-hard
 ?": PAUSE 1: PAUSE 0: LET lev=CODE INKE
Y$-48: IF lev<>1 AND lev<>2 THEN  GO TO
15
  20 CLS : PRINT  PAPER 5;AT 18,0,,"  0-
to drop piece                Any other
key to move arrow     ",,
```

Lines 10-20 Select the level required and print the details of the control keys used.

```
  30 LET u=0
  35 REM udg data
  40 DATA 255,252,240,224,192,192,128,12
8,255,63,15,7,3,3,1,1,128,128,192,192,22
4,240,252,255,1,1,3,3,7,15,63,255
  50 FOR n=USR "a" TO USR "d"+7: READ a:
 POKE n,a: NEXT n
```

Lines 30-50 Set up the user-defined graphics for the tokens.

```
  55 REM PRINT BOARD
  60 FOR n=1 TO 6: FOR m=1 TO 7: PRINT A
T n*2,m*2; PAPER 7; INK 1;"ab";AT n*2+1,
m*2;"cd": NEXT m: NEXT n
  70 PRINT AT 14,2; INK 1;"a       ba
b"
```

Lines 55-70 Print the game board, minus the counters.

```
  75 REM DEFINE ARROW
  80 DATA 1,1,9,13,15,7,3,1,128,128,144,
176,240,224,192,128
  90 FOR n=USR "e" TO USR "f"+7: READ a:
 POKE n,a: NEXT n
```

Lines 75-90 Set up the user-defined graphics to position the arrow character.

```
 100 LET x=2
 110 LET move=-1
 120 DIM a(9,8)
 130 LET zz=0
```

Lines 100-130 Set up the 'initial variables' array — a(9,8) — that will hold the state of play.

```
 135 REM CHOOSE WHO GOES FIRST
 140 IF RND<.5 THEN  GO TO 280
```

Lines 135-140 Decide whether you or the computer will be first to start the game.

```
 150 PRINT AT 0,2;"ef"
 160 LET paper=5
 170 PRINT AT 10,18;"            "
 180 FOR n=2 TO 8: IF a(n,7) THEN  NEXT
n
 190 IF n=9 THEN  GO TO 660: REM DRAW
 200 LET u=0
```

Lines 150-200 Print the arrow at the top of one of the columns and set the PAPER colour to cyan. Lines 180-190 check if the board is full — if it is, then the game is said to be drawn.

```
 205 REM YOUR MOVE
 210 LET move=move+1
 220 PRINT AT 6,19;"MOVE ";move
 230 LET a$=INKEY$: IF a$="" THEN  GO TO
 230
 240 IF a$="0" THEN  GO SUB 580: LET s=0
: LET n=x/2: LET m=5: LET u=1: GO SUB 30
0: GO TO 630
 245 REM  GO SUB 300 SCORES YOUR MOVE
 250 PRINT AT 0,x;"  ": LET x=x+2: IF x=
16 THEN  LET x=2
 260 PRINT AT 0,x;"ef": PAUSE 5: PAUSE 5
0
 270 GO TO 230
```

Lines 205-270 Make the player's move and increment the 'number of moves' counter. The keyboard is scanned for a key press, and the arrow character is moved accordingly. If the '0' key is pressed, a piece is placed in the grid and the routine is exited. Once the move has been made, the board is checked for a win.

```
 275 REM MY MOVE
 280 PRINT AT 10,18;"I'm Thinking": LET
move=move+1: PRINT AT 6,19;"MOVE ";move:
 LET hs=-1e6: FOR n=1 TO 7: LET hh=0: LE
T s=0: FOR m=2 TO 5 STEP 3
 290 IF a(n+1,7) THEN  GO TO 510
```

Lines 275-290 Make the computer's move and increment the 'number of moves' counter.

```
 295 REM CALCULATE SCORE
 300 FOR q=2 TO 7: IF a(n+1,q) THEN  NEX
T q
 310 IF u THEN  LET q=q-1
 315 REM HORIZONTAL
 320 FOR y=1 TO 3: IF a(n+1,q+y)=m THEN
 NEXT y
 330 LET z=y-1: FOR y=1 TO 3: IF a(n+1,q
-y)=m THEN  NEXT y
 340 LET z=z+y: LET s=s+5^z
 345 REM VERTICAL
 350 FOR y=1 TO 3: IF a(n+1+y,q)=m THEN
 NEXT y
 360 LET z=y-1: FOR y=1 TO 3: IF a(n+1-y
,q)=m THEN  NEXT y
 370 LET z=z+y: LET s=s+5^z
 375 REM DIAGONAL
 380 FOR y=1 TO 3: IF a(n+1+y,q+y)=m THE
N  NEXT y
 390 LET z=y-1: FOR y=1 TO 3: IF a(n+1-y
,q-y)=m THEN  NEXT y
 400 LET z=z+y: LET s=s+5^z
 410 FOR y=1 TO 3: IF a(n+1-y,q+y)=m THE
N  NEXT y
 420 LET z=y-1: FOR y=1 TO 3: IF a(n+1+y
,q-y)=m THEN  NEXT y
 430 LET z=z+y: LET s=s+5^z+RND: REM ADD
 A RANDOM ELEMENT
 440 IF u THEN  RETURN
 450 IF hh THEN  RETURN
 460 IF m=2 AND s>625 THEN  LET zz=1: LE
T hs=s: LET ht=n: GO TO 520: REM IF SCOR
E >625 THEN 4 IN A ROW!
 465 IF m=2 THEN  NEXT m
 470 LET s1=s: LET s=0
 480 IF lev=2 AND q<7 THEN  LET s=0: LET
 q=q+1: LET hh=1: GO SUB 320
 482 LET s1=s1-s*.5: IF s>625 AND hs>-1e
6 THEN  GO TO 510
 485 REM CHOOSE BEST MOVE
 490 IF s1>hs THEN  LET hs=s1: LET ht=n
 510 NEXT n
```

Lines 295-510 The score for each possible move is calculated in lines 280-430, and the best score is recorded in line 490. If level two is selected, then line 480 calls the score routine again with different parameters to find your best reply and subtracts this score from its own. The score is calculated by adding up how many counters would be in a row by placing its piece in each column. The score is then incremented by 5^z (lines 340, 370, 400 and 430) where z holds the 'number in a row'. (This means that four tokens in a row — $5^4 = 625$ — is a better score than four rows of three tokens — $4 \times 5^3 = 500$.)

```
 520 PRINT AT 0,x;"  ": LET paper=2: IF
hs=-1e6 THEN  GO TO 660
 530 LET x=ht*2
 540 PRINT AT 0,x;"ef"
 550 GO SUB 580
 560 IF zz THEN  PRINT AT 0,21;"I Win";A
T 2,18;"Press any key": BORDER 0: PAUSE
50: PAUSE 0: RUN
 570 GO TO 160
```

Lines 520-570 If no move can be made by the computer and hs (highest score) has not been changed, then the game is drawn. If zz is set to equal 625, the computer announces that it has won.

```
 575 REM PRINT MOVE
 585 IF a((x/2)+1,7) THEN  GO TO 230
 590 FOR n=2 TO 7: IF a((x/2)+1,n) THEN
 NEXT n
 600 FOR v=1 TO 16-2*n: PRINT AT v,x; IN
K 1; OVER 1; PAPER paper;"  ";AT v+1,x;"
  ";AT v-1,x; PAPER (4+3*(v>2));"  ": BE
EP .1,v+10: NEXT v
 610 LET a(x/2+1,n)=paper
 620 RETURN
```

Lines 575-620 Print the token on the grid and alter the array so that the move is recorded on-screen.

```
 625 REM YOU WIN
 630 IF s>625 THEN  PRINT AT 0,20;"You W
in";AT 2,18;"Press any key": BORDER 0: P
AUSE 50: PAUSE 0: RUN
 640 LET u=0
 650 GO TO 280
```

Lines 625-650 Contain the routine that displays the message if the player wins and offers another chance to play.

```
 655 REM DRAW
 660 PRINT AT 0,21;"DRAW";AT 1,18;"Press
 any key": PAUSE 50: PAUSE 0: RUN
```

Lines 655-660 Contain the routine controlling what happens if the game is drawn.

```
9990 SAVE "Connect 4": STOP
```

Line 9990 The 'cassette save' routine.

```
9998 ERASE "m";1;"Connect 4"
9999 CLEAR : SAVE *"m";1;"Connect 4"
```

Lines 9998-9999 Contain the 'Microdrive save' routine. Omit these lines if you don't have an Interface 1 unit connected.

CIRCE

Nick Alexander *and* **Steve Webb** *are no longer virgins in the software field —* **Phil Manchester** *takes a stroll up Portobello Road to check on how Virgin Games have beefed up their act.*



TONY SLEEP

THE SWEET INNOCENCE OF VIRGIN

Virgin Games, synonymous with Virgin Records and Virgin Airlines, is exactly where you would expect it to be. Hippy entrepreneur, Richard Branson, rules his empire from a chaotic office at the fashionable end of the Portobello Road — all Mini Mokes and expensive mews cottages. You've got to be young and trendy and rich to cut it here.

Virgin certainly qualifies in the second two categories but its principals are not as young as they used to be. Born out of the swinging 'sixties London youth culture with the straightforward and uncompromising motto, 'Do your own thing, maan', Virgin was an obvious candidate for a computer games company.

"It's a serious business venture," claimed Nick Alexander, the 'maan' in charge of Virgin Games. "But there's no reason why that shouldn't be fun — we've always tried to mix entertainment and fun together." The latest 'bit of fun' that Virgin has on the cards is to set up a cheap and cheerful airline ferrying the poor and/or mean across the Atlantic.

When yours truly arrived at the Virgin offices, the computer room was being used by the Airline people for a conference discussing which T-shirt to use to promote the new venture. That's why technical manager Steve Webb and myself duly parked our behinds on the Habitat sofa in the reception area and chatted about Virgin's software development methods.

Webb is a Spectrum freak and, flying in the face of the established practice of using a flashy development machine, builds games using the machine itself. "I use two Spectrums side-by-side linked through Microdrives. I can put the assembler and monitor in one and the actual program in the other," he said. Virgin is in the established popular market with its games aimed at the Spectrum and the Commodore 64. Webb described the Commodore as "a lazy programmers' machine" and defended the idosyncratic Spectrum as "frustrating but challenging".

He has just packaged up his knowledge of the device's innards in a book on Spectrum machine code, shortly to be published by Virgin Books (yes, another part of the empire). Webb claims that it takes you right through the intricacies of machine code programming. "There are some books on machine code programming that don't even tell you how to read the keyboard — mine does all that and lots more," he said.

But Webb and Virgin are moving on to pastures new and the conversation turned to the emerging Japanese home computer operating system, MSX. Webb sees it as the flavour of the year and Virgin is investing in developing software for it when it eventually arrives in the UK. An MSX emulator for the Spectrum? Webb didn't dismiss the idea.

The Airline people had finished the serious part of their conference and were now having fun looking at the various trendy designs for T-shirts; that meant we could go have a look at some of Virgin's product in action.

Rather than just employing spotty programmers fresh out of the fifth form, Virgin is following the US trend in staffing its development team. This involves bringing in artists, poets and musicians to package up the games ideas. Former graphic artist, Ian, explained why this helps produce better games. "Most programmers are mathematically inclined and when they get into designing graphics they get very symmetrical. I never use squared paper, for instance — it's too restricting."

Ian was working on a revamp of Virgin's Commodore 64 game, *Falcon Patrol.* It's a sort of airborne *Tranzam* with some pretty graphics and it sold well in the Commodore market. The Spectrum version is still under assessment — so don't look for it in the shops for a while.

Virgin's latest product for the Speccy is an item called *Sorcery* (see *Joystick Jury*) — a cross between an arcade action game and an adventure. "Arcade games are still where it's at and I don't think the text adventure games are as seductive as this sort of thing," said Webb. Virgin is hoping to pull a bestseller out of it; in fact, desperately needs one.

"The market we started in 15 months ago has changed — it's very different now," explained the unbelievably nice Nick Alexander. "We've not been amazingly successful, though we made quite a lot of money in the first six months of business." Alexander reckons that if it had been any other company this would have been seen as pretty good. "We got quite a pasting because we were expected to come up with something different. We wanted to tap new sources of creativity — the home programmers who didn't want to spend their lives hunched over a keyboard but maybe had some good ideas," he went on.

The highly competitive nature of the games market has changed all that and Virgin's original plan to package up programmers like rock musicians failed badly. Games buyers are not interested in what colour socks the programmer's wearing. So Virgin has reverted to a more traditional approach — the in-house development team.

But Alexander is adamant that "the marketing of the author as an artist will become more important. In striving for that we have to recognise that the things that sell are good addictive games with good graphics." Virgin has tried some off-the-wall ideas — it brought out a computerised version of ye ancient chinese oracle, the I-Ching. "It was different, but it was a commercial disaster," opined Alexander. Perhaps Virgin should have consulted the oracle first!

Meanwhile, the Airline people have decided that they don't like any of the T-shirts and are telling the artists to go away and try again. Virgin Games is going through much the same process. Whether its second attempt is more successful than the first remains to be seen. YS